EXPERIMENTAL INVESTIGATION OF IN SITU UPGRADING OF HEAVY OIL BY USING A HYDROGEN DONOR AND CATALYST DURING STEAM INJECTION

A Dissertation

by

AHMAD A. A. MOHAMMAD

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2008

Major Subject: Petroleum Engineering

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Approved by:

Chair of Committee,	Daulat D. Mamora
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ABSTRACT

Experimental Investigation of In situ Upgrading of Heavy Oil
by Using a Hydrogen Donor and Catalyst during Steam
Injection. (August 2008)
Ahmad A. A. Mohammad, B.S., Kuwait University, Kuwait;
M.S., Kuwait University
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Experiments were conducted to investigate the feasibility of in situ upgrading of heavy oil by the use of an orgametallic catalyst and a hydrogen donor (tetralin). The experiments used a vertical injection cell into which a mixture of sand, water, and Jobo oil was thoroughly mixed and packed. Two types of runs were conducted: a run where the tetralin and catalyst were mixed within the mixture before packing into the cell, and the other was conducted by injecting a slug of the tetralin-catalyst solution before commencing with the steam injection. The Jobo oil used had an oil gravity of 12.4° API and a viscosity of 7800 cp at 30°C. The injection cell was placed in a vacuum jacket and set to a reservoir temperature of 50°C. Superheated steam at 273°C was then injected into the injection cell at a rate of 5.5 cc/min (cold water equivalent). The cell outlet pressure was maintained at 500 psig. Produced liquid samples were collected periodically through a series of separators. The produced oil was divided into two halves and several measurements and analyses were carried out on them. These included viscosity, density, elemental analysis and liquid composition.

Experimental results indicated that tetralin alone was a worthy additive and increased recovery by 15% compared to that of pure steam. The premixed tetralin-catalyst run showed improved recovery to that of pure steam by 20%. Experiments also showed that, when the tetralin-catalyst solution was injected rather than mixed, the results were equivalent to tetralin injection runs. Oil production acceleration was displayed by all the runs with tetralin and tetralin-catalyst but was more pronounced with the availability of catalyst.

DEDICATION

I humbly dedicate this dissertation to my parents, my sister, and my brother.

Their patience, support and love have always given me the strength to achieve my goals.

I would like to thank them for their inspiration and encouragement.

ACKNOWLEDGEMENTS

I wish to express my deepest respect and appreciation to my committee chair, Dr. Daulat D. Mamora, for his guidance and support throughout the course of this research. I would like to thank my committee members, Dr. Akhil Datta-Gupta, Dr. Jerome J. Schubert, and Dr. Mahmoud El-Halwagi, for serving on my committee. I would also like to thank Dr. Luc Ikelle for humbly agreeing to substitute on behalf of Dr. Mahmoud El-Halwagi at my Ph.D. defense on such short notice.

Thanks, also, to my friends and colleagues and the department faculty and staff for making my time at Harold Vance Department of Petroleum Engineering a great experience.

Last, but not least, I would like to thank my sponsor Kuwait Institute for Scientific Research for giving me the opportunity to attain my Ph.D.

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CHAPTER I

INTRODUCTION

Conventional oil production is projected to peak and decline irreversibly in the coming few years, increasingly making unconventional oil more essential for future energy needs. At present, heavy oil reserves make up a large portion of unconventional resources, which include coalbed methane, tight gas and hydrates. Heavy oil production has increased substantially in the last decade as a result of market demand. This led to new technological advancements in drilling and recovery techniques and a further significant increase in production is expected. The largest heavy oil accumulations in the world are located in Venezuela and Canada. It is estimated that these accumulations contain three trillion barrels of original oil-in-place.

Common characteristic properties of heavy crude oils are high specific gravity (lower than 20 degrees API), high viscosity (greater than 1000 centipoise), low hydrogen to carbon ratios, high carbon residues, and high asphaltene, heavy metal, sulfur and nitrogen content. Heavy crude oils are difficult to produce economically due to their low gravities and correspondingly high viscosities that hinder their ability to flow within a reservoir.

This dissertation follows the style of *Journal of Petroleum Technology.*

Two thermal recovery methods have evolved in the past couple of decades to become commercially applicable, in situ combustion and steam injection. Steam injection is by far the more prevailing thermal method and several variations of it have been developed and applied successfully world wide in places such as United States, Canada, Venezuela and Indonesia (Prats 1986).

During steam injection the latent and sensible heat is conveyed to reservoir fluids and rock matrix, thus increasing their temperature. This increase in temperature results in several beneficial effects that assist in production and recovery of heavy crude oil (Prats 1986; Green and Willhite 1998; Willman et al. 1961).

- Thermal expansion of the oil.
- Reduction in the oil viscosity, predominantly in the intermediate and heavy hydrocarbon fractions.
- Distillation of the lighter hydrocarbon fractions in the steam zone.

These effects increase the production and overall recovery, but do not notably improve the quality of the crude.

Catalysts have been used for decades in refineries to improve and extract the maximum value from each barrel of produced oil, by using upgrading processes such as hydro-treating, and hydro-cracking. Catalysts have also been used for the removal of contaminants and pollutants. Removal of heavy metals and sulfur are one of the basic refinery processes, and are known as demetalization and desulfurization. The end product of heavy crude upgrading is lighter, more valuable crude. Upgrading heavy crude oil is usually carried out at a handful of refineries around the world.

Several studies have been carried out to investigate in situ heavy crude oil upgrading by using metallic additives or commercial catalysts with various hydrogen donors. In situ combustion experiments and reactor experiments have been performed using catalysts under a variety of conditions. The hydrogen donors that were used in these investigations include hydrogen gas, methane, and tetralin. In all of the previous studies an apparent improvement was observed in the following crude oil properties (1) API gravity, (2) hydrogen-carbon ratio, (3) asphaltene, heavy metal, and sulfur content, and (4) viscosity.

Experimental results to-date demonstrate that in situ upgrading of heavy oil process has great potential, especially when we consider some of the advantages it has over conventional surface upgrading technology. First, in situ upgrading enhances oil recovery, increases oil reserves, as well as increases well production and lowers lifting and transportation costs from reservoir to refinery. In situ upgrading eliminates the cost of building catalytic reactors - the reservoir acts as a natural reactor vessel. The in situ processes can be applied onshore and offshore as well as in remote locations, where surface upgraders would be inappropriate or even prohibited. Second, in surface refining, the crude is divided into fractions of different boiling ranges for processing. That is not the case for in situ upgrading: the crude oil is upgraded as a whole. Third, in situ upgrading can be applied on a well-to-well basis and can be adjusted for declining production rates, whereas surface processing facilities are designed for a limited range of crude volume. Fourth, implementing in situ upgrading significantly reduces energy consumption since the same energy from the injected steam is used to produce and

upgrade the oil. Finally, in situ upgrading is superior environmentally; yielding lower quantities of byproducts that translates into a reduction in disposal expenditure.

In the proposed research, in situ upgrading of heavy oil will be investigated under steam injection as a thermal recovery process. The proposed process will involve the addition of a catalyst and a hydrogen donor in conjunction with steam injection. For this study, crude oil from Jobo field will be used. The field is located in eastern Venezuela just south of Monagas state with an estimated 25.7 billion barrels original-oil-in-place. Jobo crude oil gravity ranges from 8.5° to 12.5°API and its viscosity ranges from 60 to 1850 cp. Reservoir temperatures average from 117 to 148°F at reservoir depths of 3260 to 3685 feet. Permeability of the Jobo reservoir ranges from 2.5 to 5 darcy and its initial reservoir pressure is around 1300 psig (McGee 1987; Yibirin and McGee 1988; Chedid 1992; Blann et al. 1999).

The research is aimed at verifying the potential of in situ upgrading of heavy oil by steam injection. A series of experiments will be performed to evaluate the extent and potential of oil upgrading by the use of a steam injection process with catalysts and tetralin (as hydrogen donor). The potential and extent of upgrading will be confirmed from additional analysis that will be carried out on the produced oil.

1.1 Mechanisms of Steam Injection

Since its implementation, the principles and mechanisms of steam injection have been very well established. During a steam injection process five separate regions are formed as steam flows through the reservoir matrix. Each zone is divided with respect to the distance from the injection well and has its distinct characteristics. Starting with the

zone nearest to the injection well is the steam bank. This region consists of residual oil and water in liquid and vapor phase. The second zone is known as the solvent bank and consists of condensed light fractions of oil that were vaporized in the steam zone. This solvent bank is miscible with oil, thereby reducing the oil's viscosity and interfacial tension. The third zone is the hot water bank; it is the zone where the steam and volatile oil condense as they contact the cooler matrix. The fourth region is the oil bank and is formed from oil displacement and viscosity reduction of the three previous zones. The last region is the reservoir fluid zone made up of the original reservoir fluids. A graphical illustration of the five zones can be see in **Fig. 1.1** (Hong 1994) showing the temperature profiles and oil saturations.

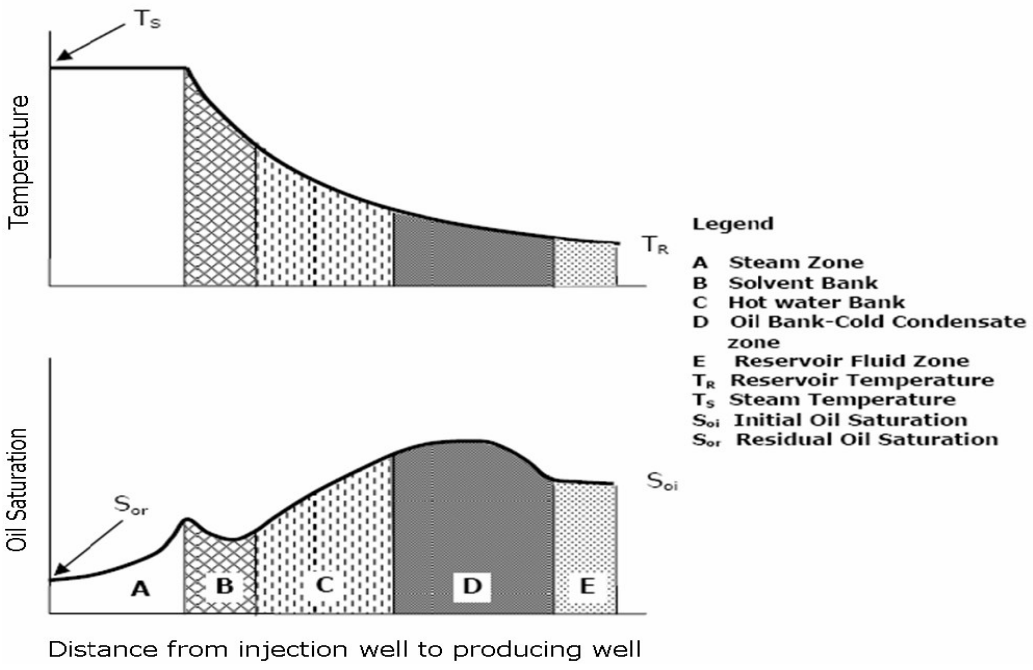

Fig.1.1- Temperature and saturation profiles during steam injection.

1.2 Tetralin – Brief Description

Tetralin ($C_{10}H_{12}$) is also known as tetrahydronaphthalene. It is a bicyclic organic compound. Tetralin is made up of two benzene rings as illustrated in **Fig. 1.2**.

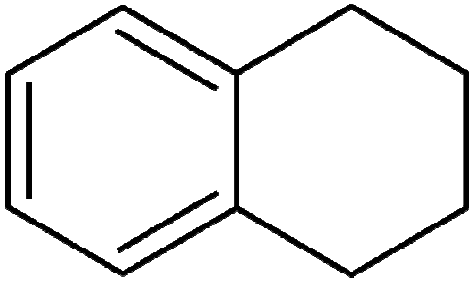

Fig.1.2– The structure of tetralin.

Commercial grade tetralin is typically 97% pure by weight with the majority of the impurity comprising of naphthalene and decahydronaphthalene. Tetralin is a hydrogenation product of naphthalene. This hydrogenation is achieved in the presence of a nickel based catalyst. Tetralin is in very high demand with annual production/importation in the millions of pounds. In general tetralin is widely used as an industrial solvent for waxes, naphthalene, fat, resins and oils. Tetralin is also used:

- as a substitute for turpentine in lacquers, paints and varnishes,
- as a solvent and stabilizer for shoe polishes and floor waxes,
- as a constituent of motor fuels and lubricants,
- in alkali resistant lacquers for cleaning printing ink from rollers,
- in the textile industry as a dye solvent carrier,

- as an insecticide for clothes-moths and a larvicide for mosquitoes,
- as an intermediate for manufacturing certain agricultural chemicals such as carbaryl and napropamide.
- as solvents for pesticides, rubber, asphalt and aromatic hydrocarbons.

The basic properties of tetralin are shown in **Table 1.1**.

Table 1.1– Properties of tetralin.

IUPAC	1,2,3,4 tetrahydronaphthalene
SMILES	C1CCC2=CC=CC=C2C1
Molecular formula	$C_{10}H_{12}$
Molar mass	132.202 g/mol
Appearance	Clear, colorless liquid
Density	0.970 – 0.975 g/cm^3
Boiling point	206 – 208 ºC (403 - 406ºF)
Melting point	-35.8 ºC (-33 ºF)
Solubility in water	Insoluble
Flash point	77 ºC 170.6 ºF)
Autoignition temperature	385 ºC (725 ºF)

1.3 Catalysts – Brief Description

In 1836 the phrase, catalyzed process, was introduced to describe reactions, accelerated by substances which remain unchanged after the reaction. Catalysts are substances (can be pure elements) which alter the rate of a chemical reaction but are chemically unchanged at the end of the reaction. Not all catalysts increase the chemical reactions. Inhibitors, actually slow down chemical reactions, and are used for example to slow down corrosion reactions.

Positive catalysts or promoters increase the rate of a reaction. This is achieved by increasing the chance of molecules to collide, either by adsorption or a process known as intermediate compounds. Adsorption occurs when two molecules are held so close together on the surface of the catalyst, increasing the probability the molecules will collide and therefore react with each other. The intermediate compound process is very simple: the reactive chemical combine with the catalyst making a very unstable compound. When this unstable compound breaks down it releases the original catalyst and the new compounds. In both these methods the activation energy needed for the reaction is reduced.

There are two main types of catalysts, heterogeneous and homogeneous. Homogeneous catalysts are in the same phase as the reactants (e.g. a dissolved catalyst in a liquid reaction mixture), whereas heterogeneous catalysts are present in different phases from the reactants (e.g. a solid catalyst in a liquid or gases reaction mixture). A homogeneous catalyst works by initiating reactions with one or more reactants and forming intermediates (intermediate compound process) and in some cases one or more products. Subsequent reactions lead to the formation of the remaining products and to the regeneration of the catalyst. In this research a homogeneous catalyst was used; iron acetylacetonate ($Fe(acac)_3$).

This form of iron ($Fe(acac)_3$) is soluble in organic solvents, such as tetralin. Due to the molecular structure and properties, iron acetylacetonate is commonly used in various catalytic reagents for organic synthesis. Some properties of $Fe(acac)_3$ are shown in **Table 1.2**.

Table 1.2– Properties of $Fe(acac)_3$.

Formula	$Fe(CH_3COCHCOCH_3)_3$
Appearance	Orange-Red
Molecular weight	353.18
Density	5.24 g/cm3
Melting point	184 ºC (363.2 ºF)
Solubility	Soluble in organic solvents

1.4 Research Objectives

The main research objective is to evaluate the possibility of in situ upgrading of heavy crude oil by steam injection with the aid of a catalyst and a hydrogen donor. The extent and degree of oil upgrading will also be assessed to confirm the potential of replacing or partially replacing surface upgrading facilities. We will also identify which fractions, if any, of the crude oil will be most influenced by the catalyst assisted steam injection process. The extent of upgrading will be established through various analyses of the produced and initial crude oil. These would include measurements of oil gravity, oil viscosity, hydrogen-carbon ratio, heavy metal content and composition using GC analysis.

During the experiments several parameters will be recorded that include injection/production rates and pressures, as well as the cell temperature profile and produced volume of water and oil, which may help in predicting ultimate conditions for in situ upgrading. Final oil recovery will be measured and a comparison of the runs will help lead us to an appropriate conclusion.

CHAPTER II

LITERATURE REVIEW

Numerous studies have been performed to investigate steam injection effects on heavy crude oil. As mentioned earlier, the primary mechanisms responsible for oil recovery in steam injection processes are thermal expansion of the oil, viscosity reduction, and steam distillation. The use of catalysts and hydrogen donors for in situ oil upgrading has been investigated in previous studies in conjunction with the application of thermal oil recovery methods. In this section, a literature review of these studies is presented.

In the mid-1960's Henderson and Weber (1965) researched the effects of heat on seven different heavy crude oils to investigate permanent upgrading. The study reported that crude oil heated to temperatures below 500°F resulted in very slow cracking reactions that are not particularly useful. The same crude oil heated at 600°F for nine days produced the same degree of upgrading as of that heated at 700°F for only 6 hours. However, the rate of coke formation increases markedly above 700°F, especially at high pressures. The tests also permitted them to estimate the time-temperature history required to achieve a certain degree of upgrading.

Vallejos et al. (2000) investigated downhole extra heavy oil upgrading by using a hydrogen donor (tetralin), and methane under steam injection conditions. The experiments used Hamaca oil sands with water, tetralin (weight ratio 10:1:1) and pressurized with methane in a stainless steel batch reactor. No metal additives or

catalysts were added, but rather the original mineral containing formation was used. Each run was for 24 hours at 280°C, and final pressure of 1600 psig. The experiments showed a 3°API increase in the oil gravity, a three-fold reduction in viscosity, and an 8% decrease in the asphaltene content. The results demonstrate that this method appears to be feasible in steam stimulation processes.

Ovalles et al. (2001) carried out the same type of experiments as Vallejos et al. (2000) but varied the reactor residence time between 16 and 32 hours and used two additional Venezuelan crude oils. They also attempted to use toluene as a hydrogen donor but it showed no upgrading effect. The API gravity increased and asphaltene content decreased with time and temperature, with temperature being the more dominant parameter.

Batch reactor experiments were performed by Ovalles et al. (1998), for Hamaca crude oil with dispersed molybdenum catalyst derived from $MoO_2(acac)_2$ (where acac = acetylacetonate) along with various gases as hydrogen donors. Runs were made with methane, argon and hydrogen, where methane proved to be the most successful. The 1-hour runs were conducted at 410°C and 1595 psi. The methane run resulted in an increase of 7°API oil gravity, 16% reduction in sulfur content and 55% conversion of the >500°C fraction with respect to the original crude. They also reported using carbon isotope ratio mass spectrometry analysis to confirm that methane was integrated into the upgraded crude oil molecules with an estimated value of 0.01% w/w.

Fan et al. (2001) investigated the effects of minerals, catalyst, and steam on the hydrocarbon group, viscosity, and element distribution of the heavy oil. The experiments

used three different heavy oils with various combinations of water, catalyst and minerals placed in the reaction system at 240°C to examine their upgrading effects. This study confirmed that the reservoir minerals have a catalytic effect on the aquathermolysis of heavy oil. The effects of the catalyst and minerals coexist under steam conditions and resulted in the following changes to the oil properties:

- Increase in saturate and aromatic content and decrease in resin and asphaltene content.
- Increase in all the measured gases (H_2, CH_4, C2, C_3-C_7, CO_2 and H_2S).
- 85% decrease in the oil viscosity.
- Decrease in the oil molecular weight and asphaltene molecular weight by over 60%.

Later Liu and Fan (2002) examined the change in heavy oil viscosity in the presence of a hydrogen donor (tetralin) during steam processes. Different amounts of tetralin (0-1.0 wt %) were put into the reaction system with the oil and water or a catalyst solution. The reaction was carried out at 240°C and lasted for 24 hours, with viscosity measurement and SARA analysis performed at 5, 10, and 20 days after the end of the reaction. The investigation brought forth the following conclusions:

- Heavy oil viscosity decreased after aquathermolysis but later measurements of viscosity (5, 10 and 20 days) after the reaction showed a significantly increase.
- The viscosity regression was a result of polymerization, where the existing active chains within the reacted heavy oil connected to each other.
- Hydrogen donor can control the viscosity regression, by defusing the active chains

produced during the aquathermolysis process.

Clark et al. (1989) studied the effects of aqueous metal ion species on homogenized oil sand core samples at high temperature (240℃). An autoclave reactor was used to contain the mixture of oil, water and metal salts. Each reaction lasted from 14 to 28 days, after which viscosity and gas production analysis were performed. The study reported the largest reductions of oil viscosities were for Fe, Co, Al, Cr and Cu, with an average decrease of 64%. The optimum metal salt concentration for ferrous sulfate was found to be 0.01M. The authors concluded that viscosity of oil was reduced more with steam and metal species than with pure steam, and iron salts were especially effective. They also concluded that the combination of steam/metal salts caused changes in the compositions of oil and reduced the asphaltene molecular sizes. It was believed that the interaction of the metal species with organosulfur heavy oil components led to some molecular alteration.

Recently Zhong et al. (2003) conducted aquathermolytic experiments using a reactor to hold the oil, water, hydrogen donor and catalyst (Fe(II)) at temperatures ranging from 160-260℃ for 72 hour periods at pressures ranging between 1450 to 3625 psi. Comparisons of using catalyst with and without hydrogen donor were also performed. The results demonstrated that tetralin alone reduced the oil viscosity by 40%, and the catalyst alone reduced the oil viscosity by 60%, while the combination of catalyst and tetralin decreased the viscosity by 90%, suggesting a synergetic effect on the heavy oil aquathermolysis. The authors reported a successful 5-well field test of the process which increased the production of each well by 828 tons, and an 80% reduction

in oil viscosity was achieved. They concluded that the laboratory experiments resulted in a decrease in the average molecular weight, asphaltene, sulfur and resin contents while observing an increase in hydrogen-carbon ratio, aromatics and saturated hydrocarbons.

Jiang et al. (2005) compared the results of a second crude oil to that of their earlier work (2003). They also reported further field tests of 20 wells where the average increase in production was 550 tons and an oil viscosity reduction of 80%.

The most recent research of catalyst in situ upgrading was performed by Nares et al. (2006). Several commercial and non-commercial catalysts were used for a comparative study, where heavy crude oil was mixed with each of the catalyst and placed in a reactor. The reactor was hydrogen pressurized to 1566 psi, heated to 350℃ and left for 4 hours. The results showed upgrading potential for all the catalysts, supported ($MoCoP/Al_2O_3$ & $MoWNiCo/Al_2O_3$) and unsupported ($Mo(II)(acac)_2$ & $Fe(III)(acac)_3$). The comparison was very difficult to establish since the unsupported catalyst was dissolved in tetralin-1-butanol, which might have behaved as a hydrogen donor. Although, the iron catalyst showed the highest increase of the API oil gravity, it exhibited high coke formation when compare to the molybdenum catalyst or to that of the iron/molybdenum catalyst mixture.

CHAPTER III

EXPERIMENTAL APPARATUS AND PROCEDURE

3.1 Experimental Apparatus

The experimental apparatus is made up of four main parts: injection cell, fluid injection system, fluid production system and data recording system. A schematic diagram of the complete system is shown in **Fig. 3.1**.

3.1.1 Injection Cell

The cell is a stainless steel cylinder (**Fig. 3.2**) that holds the mixture of sand, water and oil. It has a length of 27 inches and an inner diameter of 2.90 inches. The cell also has a thermowell at its center running through its longitudinal axis. A thermocouple bundle is placed inside the thermowell (**Fig. 3.3**). This thermocouple bundle consists of six individual thermocouples – the tips spaced out as shown in **Fig. 3.3** - that monitor the temperature propagation throughout the length of the cell. Attached at the very end of the thermowell is a series of sand screens to prevent any sand production.

To heat up the mixture within the cell to reservoir temperature, it is placed inside a vacuum jacket with built-in electric heaters. The electric heaters have a temperature controller to regulate and sustain the desired temperature. The electric heater is set to reservoir temperature and left overnight to insure uniform temperature throughout the mixture. The vacuum jacket is connected to a vacuum pump which creates a vacuum in the annulus between the walls of the injection cell and the vacuum jacket. This vacuum acts as an insulator and reduces heat loss during steam injection cell.

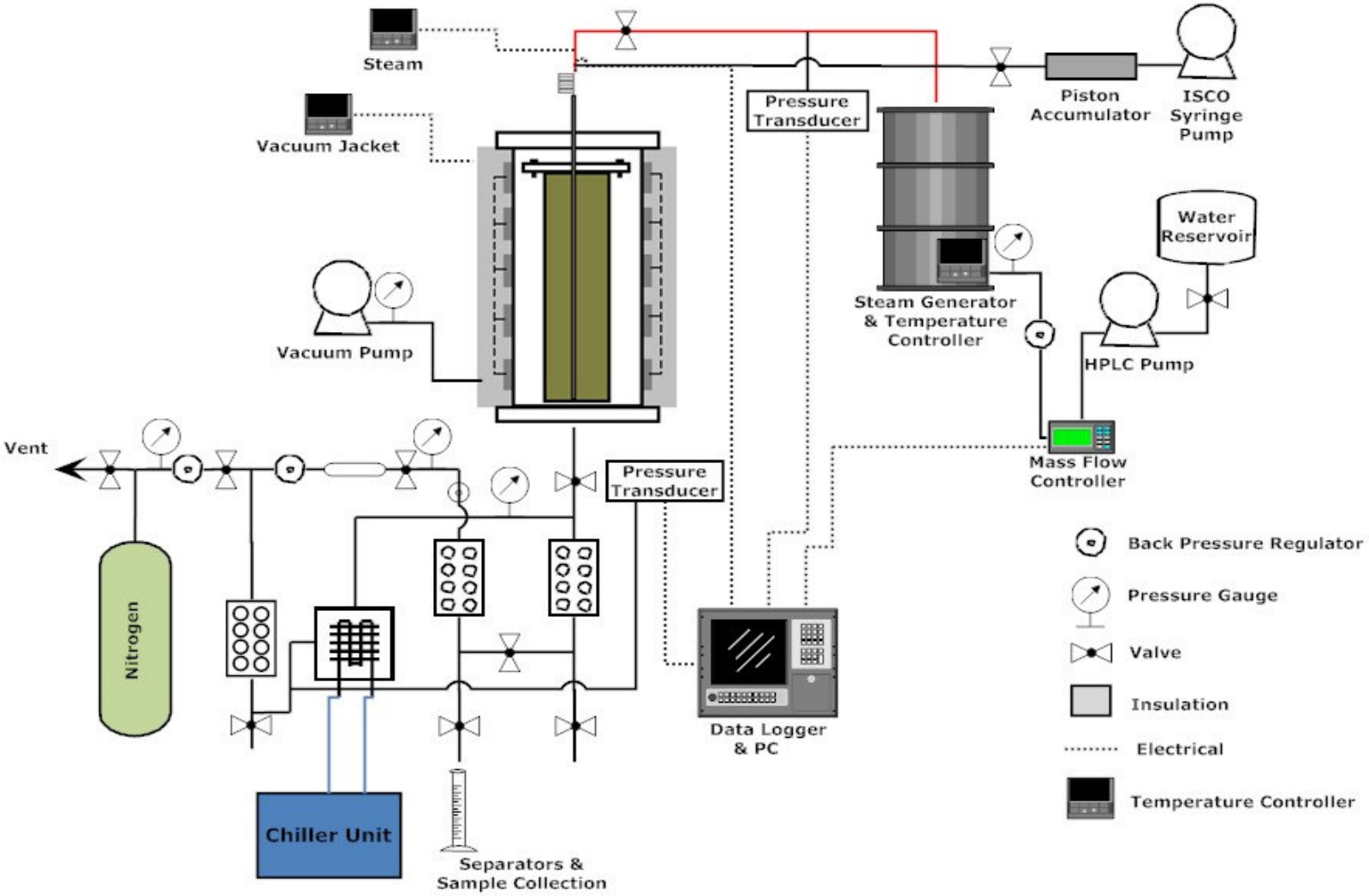

Fig. 3.1- Schematic diagram of the steam injection apparatus.

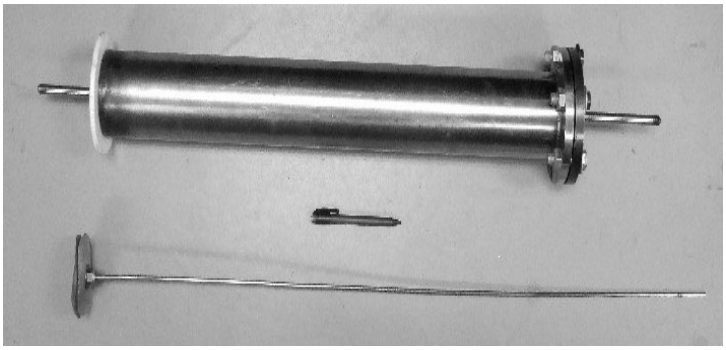

Fig. 3.2- Photograph of the injection cell and thermowell.

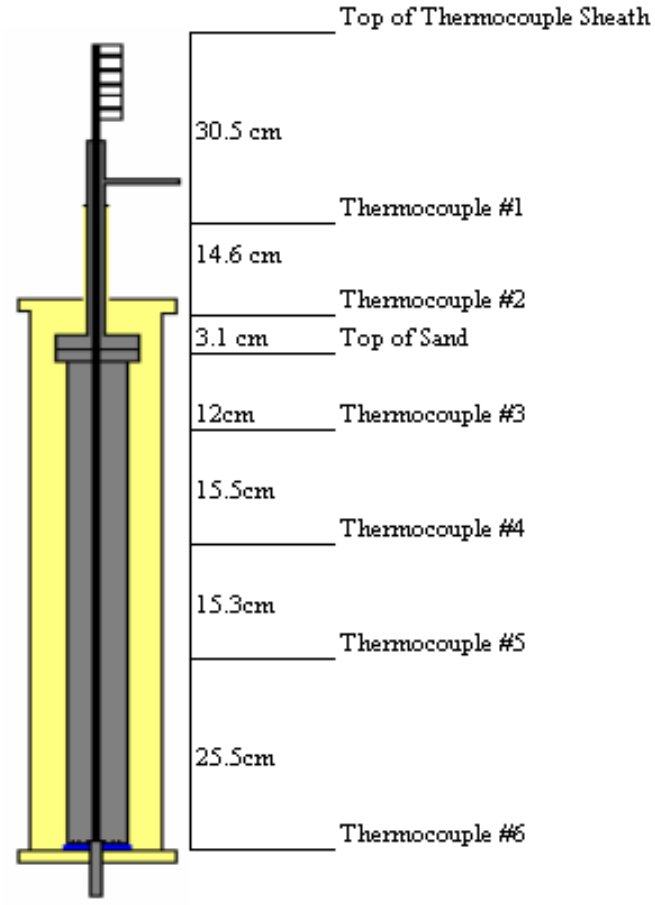

Fig. 3.3- Schematic diagram of the thermocouples in the injection cell.

3.1.2 Fluid Injection System

The system is made up of several major components:

- Two high Performance Liquid Chromatography pump (HPLC)
- Steam generator
- Accumulator
- Water reservoir

The HLPC pump receives a constant supply of distilled water from the water reservoir and pumps it into the steam generator. The pump is set at a desired rate and is monitored by a mass flow meter whose readings are directly fed into the data logger system. The steam generator has a temperature controller to maintain the selected steam temperature. The second HPLC pump in conjunction with an accumulator is used to inject supplementary fluids into the system such as the tetralin (hydrogen donor). It is also worthy to mention that a temperature-controlled band heater is used to prevent a certain and significant heat loss across the tubing line connecting the steam generator to the injection cell.

3.1.3 Fluid Production System

The production system consists of three separators and a condenser (**Fig. 3.4**). Fluids flowing out of the cell pass through a heated tubing to the first separator. A temperature controlled band heater is used, and set at 60°C to heat this tubing. A backpressure regulator maintains the cell outlet at a constant pressure by the use of nitrogen gas. Produced gas runs from the first separator through a condenser that leads to the bottom of the third separator where produced condensate can be collected. The

condenser unit is kept cool with the aid of a water chiller unit. The first separator is also connected to a second separator that is pressure regulated by nitrogen gas at a constant pressure of 80 psig. Liquid samples are typically collected at the bottom of the second separator in 50 cc graduated tubes. Any liquid carry-over in the gas stream can be collected from the third separator.

3.1.4 Data Measurement and Recording System

The data recording system consists of a data logger and a personal computer (**Fig. 3.5**). The parameters are recorded every 30 seconds into a pre-selected data file. The data logger registers the following.

- Steam injection pressure,
- Outlet cell pressure,
- Injection temperature
- Cell profile temperatures, and
- Water pump rate

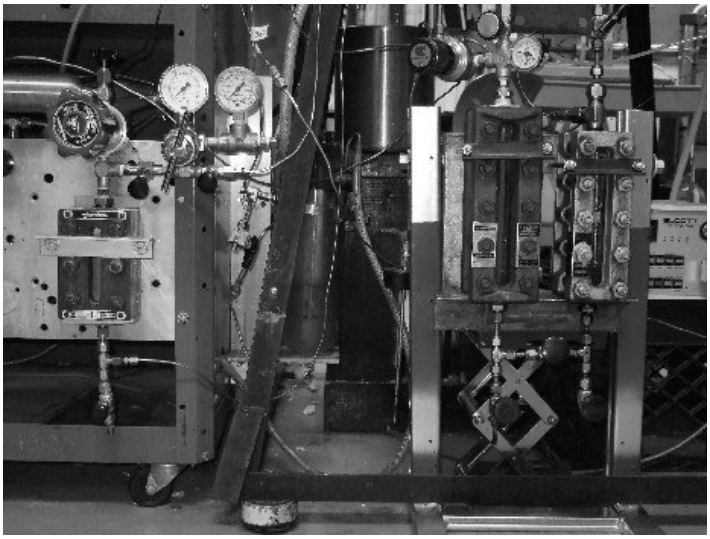

Fig. 3.4- Photograph of the production separator system.

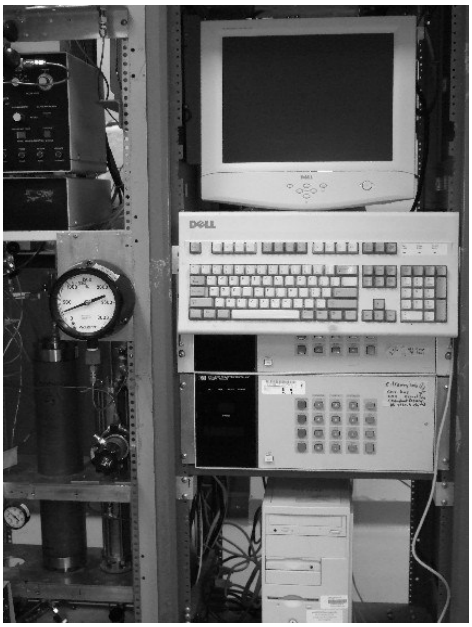

Fig. 3.5- Data recording system consists of a data logger and a personal computer.

A brief description of the main components of the experimental equipment follows.

- HPLC pump: Beckman (model 100A) High Performance Liquid Chromatograph pump supplies continuous water to the steam generator.
- HPLC pump: An Alcott High Performance Liquid Chromatograph pump is used to inject the tetralin or tetralin catalyst solution into the cell via the steam generator.
- Steam Generator: Custom made by Texaco with a maximum pressure of 2000 psig and a maximum temperature of 1200°F, that provides the necessary steam of the experiments.
- Temperature controllers: A dual circuit temperature controller is used to maintain constant temperature of the steam generator. Other temperature controllers were also used to maintain temperatures for the heating jacket and two band heaters used at the inlet and outlet of the injection cell.
- Injection cell: A stainless steel cell that measures 68 cm in length and 7.37 cm in diameter. And can withstand a maximum pressure of 500 psig at 1000°F.
- Accumulator: A 150 cc stainless steel, high pressure bottle was used to hold the necessary injection fluids.
- Heating jacket: A stainless steel cylinder with five steel band heaters and is well insulated to prevent heat loss. It confines the injection cell and the heaters heat the injection cell to reservoir temperature before steam injection and the annulus is evacuated with a vacuum pump just before steam injection to minimize heat loss during steam injection.

- Vacuum pump: used to evacuate the annulus between the injection cell and the heating jacket to minimize heat loss.
- Three-stage separation and sampling system: These are used to separate the liquids from the gases and also to sample the production. They consist of three high temperature high pressure transparent glass level gauges. The first separator in connected to the outlet of the injection cell and the backpressure nitrogen line from the top and connects to the second separator from the bottom The second separator is used to collect the liquid sample at pre-selected intervals. The first separator also connects to a condenser to liquefy the gases before they are collected in third separator.
- Chiller unit: used to lower the temperature of the condenser between first and third separator.
- Data logger: a Hawlett Packard data acquisition unit was used to log the necessary data such as temperature, pressure and injection rate.

The experimental apparatus are shown in the photographs at the end of this chapter.

3.2 Experimental Procedure

First, the equipment was flushed and cleaned to prevent contamination of the sand mix. This included the steam generator, injection cell, tubing, separators, pumps and water reservoir. To insure proper function, operation, and accuracy, some of the equipment like pressure transducers, pumps, gauges, and data logger system has to be checked and calibrated. The next step was preparing the mixture.

A predetermined weight ratio of sand, distilled water and oil is mixed thoroughly in a stainless steel bowl to produce a uniform mixture. The tetralin and/or tetralin/catalyst solution can either be premixed with the sand, water and oil mixture prior to tamping or they can be injected into the cell just before steam injection as a slug via the accumulator and second HPLC pump setup. The empty injection cell is weighed prior to tamping and after tamping. The difference in weight is the exact amount of mixture inside the cell. This information combined with fluid and sand densities are used to calculate the pore volume, fluid volumes and saturations within the cell. The injection cell is then pressure tested and ready to be slotted into the vacuum jacket. The cell inlet and outlet are connected to the steam generator and separator respectively.

The temperature of the vacuum jacket is set and left overnight to insure the mixture has reached the required reservoir temperature (50°C). The annulus between the cell and jacket is evacuated to insure minimal heat loss during the steam injection. To prevent further heat losses one electrical band heater is wrapped around the tubing connecting the cell inlet and to the outlet of the steam generator. One band heater is also wrapped around the first separator. With the thermocouple placed in the thermowell the cell can now be pressurized (500 psig) using nitrogen gas.

The HPLC pump is set to feed water into the steam generator at a constant rate (5.5 cc/min) that is monitored by a mass flowmeter. Injection into the cell begins once the steam generator reaches its preset temperature (273°C) and pressure (500 psig). The steam injection temperature is maintained by using a temperature controller. Production

pressure at the cell outlet is controlled by nitrogen gas supplied through a backpressure regulator.

Periodic sampling was carried out from the second separator by enabling flow from the first separator. The samples are centrifuged for 30 minute at 2000 RPM to insure separation of oil and water for proper measurement of production volumes. The oil production is divided into to equal fractions, one of the first half of the production and the other for the remainder part of the production. Oil density and viscosity for the two production samples are measured using an Anton Parr DMA 4100 density meter and a Brookfield rheometer.

Water rate, injection pressure, injection temperature, production pressure and cell temperature profile were recorded by the data logger system. The data logger system records data every 30 second. The data is displayed real time on the computer display to assist in monitoring experimental conditions during the run.

CHAPTER IV

EXPERIMENTAL RESULTS

4.1 Overview

For all the runs conducted in this research several experimental parameters were kept constant to allow for a valid comparison between runs. The parameters kept constant for all runs are:

- Initial cell temperature: 50°C
- Steam injection temperature: 273°C
- Steam injection rate: 5.5 cc/min CWE (cold water equivalent)
- Cell backpressure or production pressure: 500 psig
- Vacuum jacket pressure: -26 inches mercury

Also the sand, water, and oil mixture properties were kept as constant as possible by following a consistent mixing and tamping procedure. The properties of the mixture inside the injection cell are shown in **Table 4.1**.

Each run will be reviewed separately as a section in this chapter. A global comparison between all the various cases will be reviewed at the end. For each of the cases a collection of the experimental data will be presented. This data includes:

- Temperature profile inside the injection cell
- Injection, production, and differential pressures profile
- Liquid (oil & water) production rate and recovery
- Average steam front velocity

- Viscosity and density of original and produced oil
- Hydrogen to carbon ratio for produced oil samples
- Heavy metal (V & Ni) and GC analysis for produced oil samples

A summary of the runs is given as follows:

- Run 1: Base run using pure steam only.
- Run 2: 5 wt% tetralin injected as a slug, before steam.
- Run 3: 5 wt% tetralin mixed into the sand mixture prior to tamping.
- Run 4: 15 wt% tetralin injected as a slug, before steam.
- Run 5: 5 wt% tetralin-catalyst solution injected as a slug before steam.
- Run 6: 5 wt% tetralin-catalyst solution mixed into the sand mixture prior to tamping.

The calculations for the cell mixture are presented in Appendix A. The temperature, Pressure and injection rate data; production data; and produced oil analysis data are shown in Appendix B, C and D respectively.

Table 4.1- Injection cell mixture properties for Runs 1 to 6.

	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
Porosity, %	39.2	38.5	40.6	38.8	38.9	39.8
Pore volume, cm^3	1138	1119	1181	1127	1130	1156
Water volume, cm^3	206	208	201	207	207	204
Oil volume, cm^3	413	417	403	415	414	408
Tetralin volume, cm^3	0	0	20	0	0	20
Water saturation, %	18.1	18.6	17.0	18.4	18.3	17.6
Oil saturation, %	36.3	37.2	34.1	36.8	36.7	35.3
Tetralin saturation, %	0.0	0.0	1.7	0.0	0.0	1.8
Air saturation, %	45.6	44.2	47.2	44.8	45.0	45.3

4.2 Run 1 (Run Only Pure Steam)

This is the base run, a pure steam injection run with no additive (tetralin or catalyst).

The temperature profiles for this run are shown in **Fig. 4.1**. The calculated average steam injection temperature is estimated as 274°C. Oscillation in the steam injection temperature is observed due to the combination of the two temperature controllers used for the steam generator and the band heater. From **Fig. 4.2** it was determined that at 200 minutes, the temperature inside the whole length of the injection cell was approximately 242°C (saturation temperature).

The cumulative produced volumes of oil and water with respect to time and pore volume of steam injected are illustrated in **Fig. 4.3** and **Fig. 4.4**. The total oil produced at the end of the run (288 minutes) was 131 cm^3, representing 31.7% of the original oil in place (OOIP). The recovery versus time and pore volume can be seen in **Fig. 4.5** and **Fig. 4.6** respectively. The oil and water rates are plotted against time and pore volume in **Fig. 4.7** and **Fig. 4.8**. The figures show a peak oil production rate of 2.3 cm^3/min, whereas the peak water rate was 9 cm^3/min.

The production, injection and differential pressures are shown in **Fig. 4.9**. The production pressure is maintained at 500 psig during the entire run. The maximum differential pressure was 13.1 psig and the average differential pressure for the entire run is estimated as 3.1 psig.

The steam front velocity is shown in **Fig. 4.10**. A linear regression was used to find the average overall steam front velocity. It is observed that from time 100 to 145

minutes there was a decrease in the velocity, after which the velocity increased towards the end of the run. The average steam front velocity was calculated as 0.33 cm/min (19.8 cm/hour).

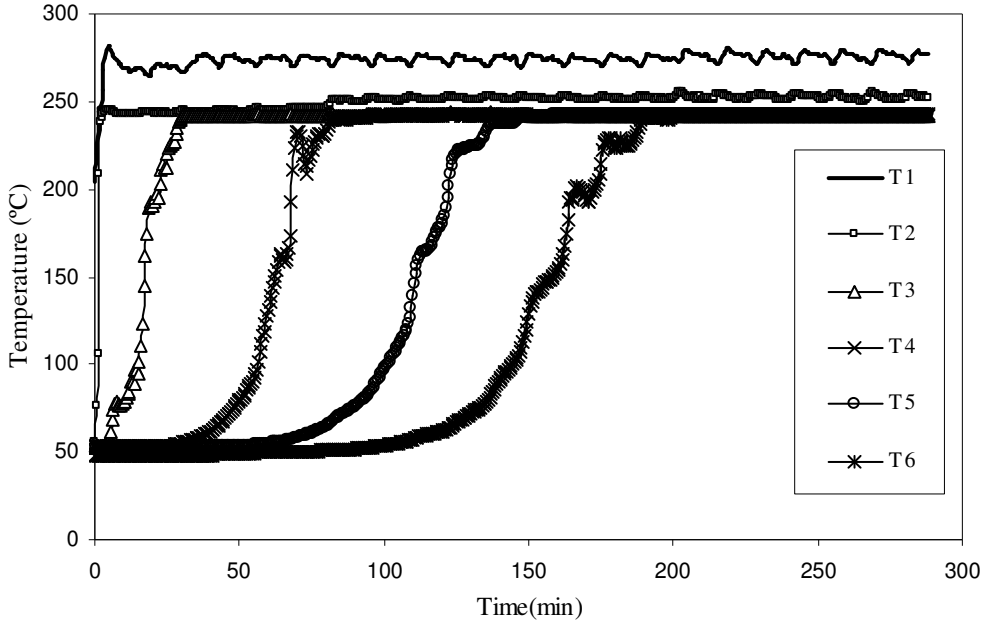

Fig. 4.1– Temperature profile versus time for Run 1.

GC analysis for the initial oil and the two produced oil samples are shown in **Fig. 4.11**. The production is split in half to make up two samples that represent each half of the production. The figure shows that the produced oil had higher percentages of C_8 to C_{17} fractions. This suggests that the heavier components C_{20+} were not produced as much as the C_8 to C_{17} components. The light components (C_1-C_6) are observed in very small amounts in the initial oil only, but were completely absent in the produced

samples. This may be due to their high volatility, these fractions may have been lost during the separation process.

Table 4.2 shows the properties of the initial oil and the production samples. The oil gravity increased with respect to time by 4.57°API from the initial oil to the second produced sample. The viscosity and density decreased with time. The heavy metal analysis showed a 23% reduction in both vanadium and nickel for the second sample, whereas the overall average decrease was around 17% for each of the metals. The hydrogen to carbon ratio showed an unexpected slight decrease.

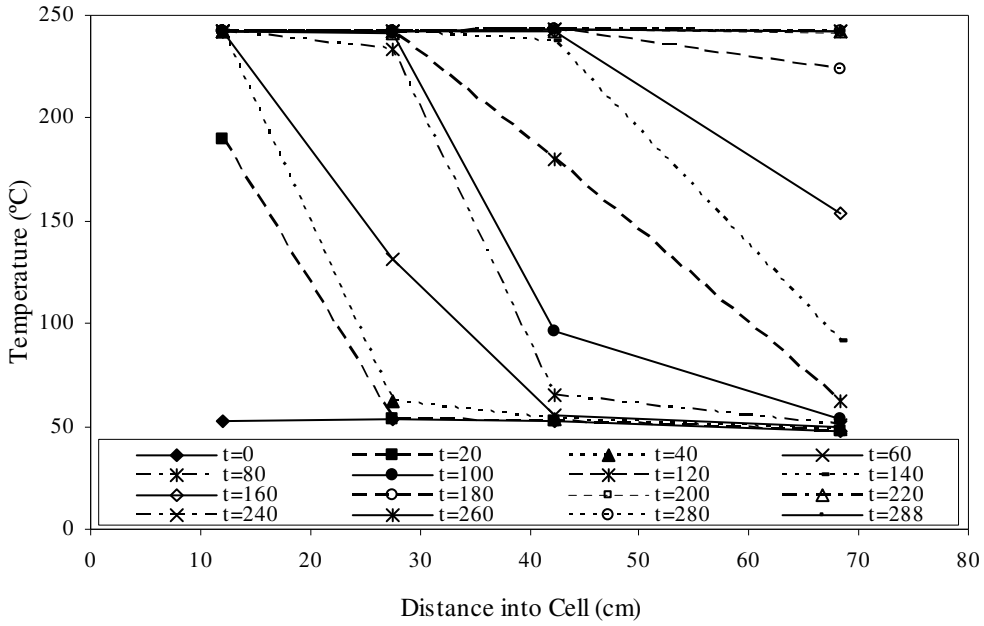

Fig. 4.2– Temperature profiles at 20 min intervals for Run 1.

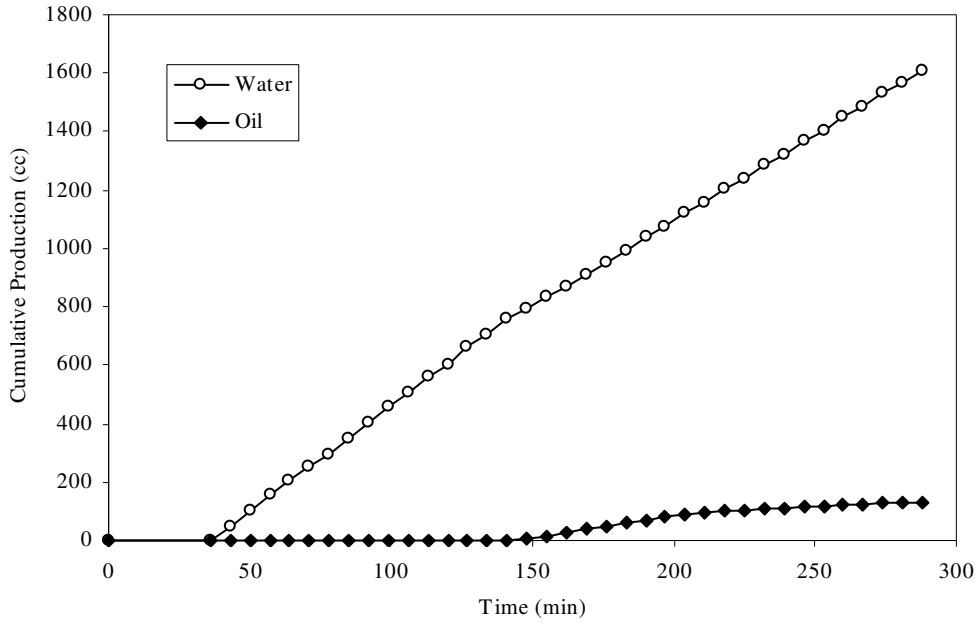

Fig. 4.3- Cumulative oil and water production versus time for Run 1.

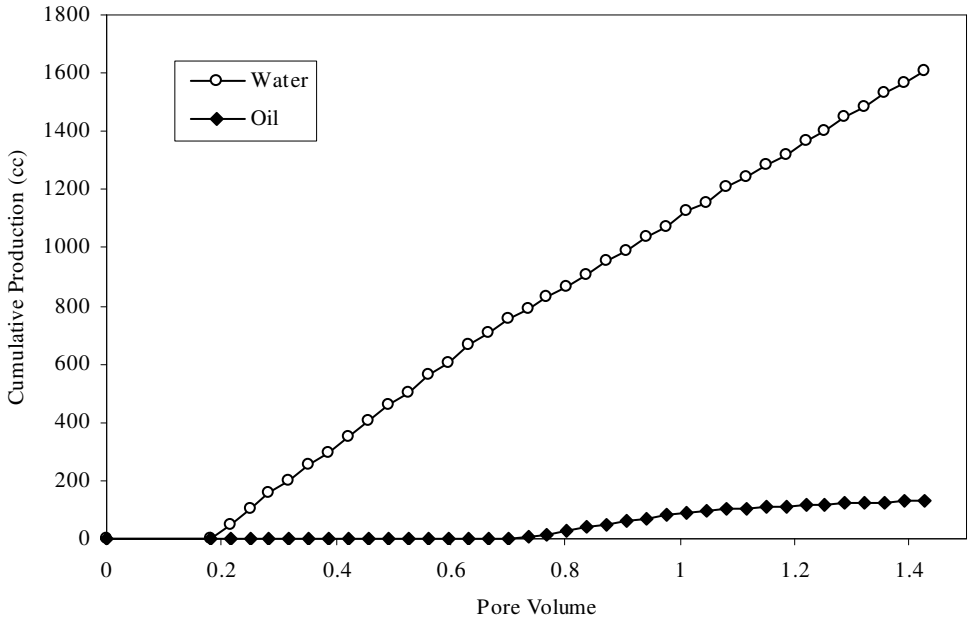

Fig. 4.4– Cumulative oil and water production versus pore volume for Run 1.

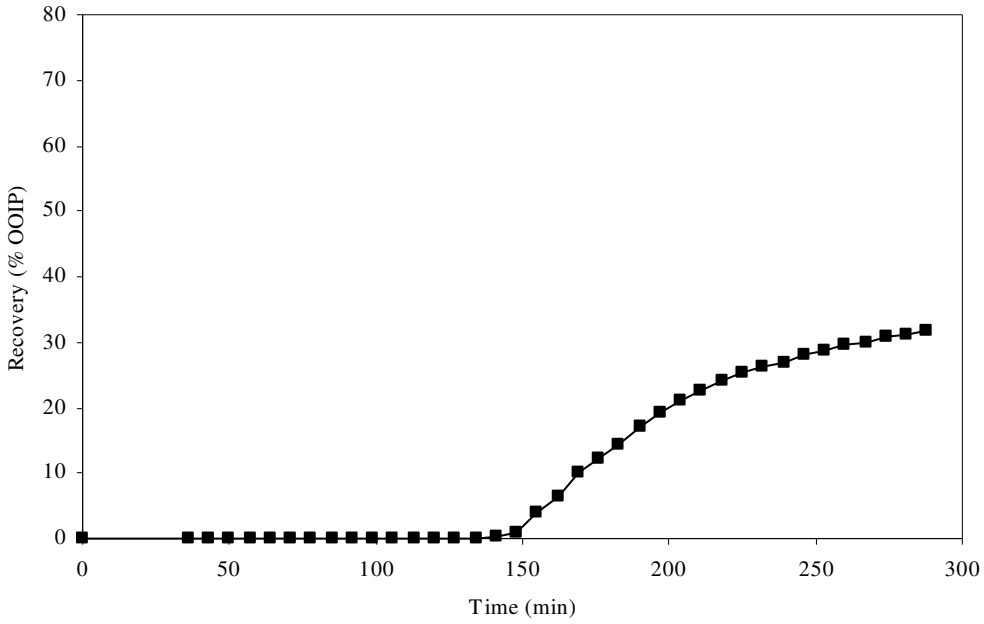

Fig. 4.5– Oil recovery versus time for Run 1.

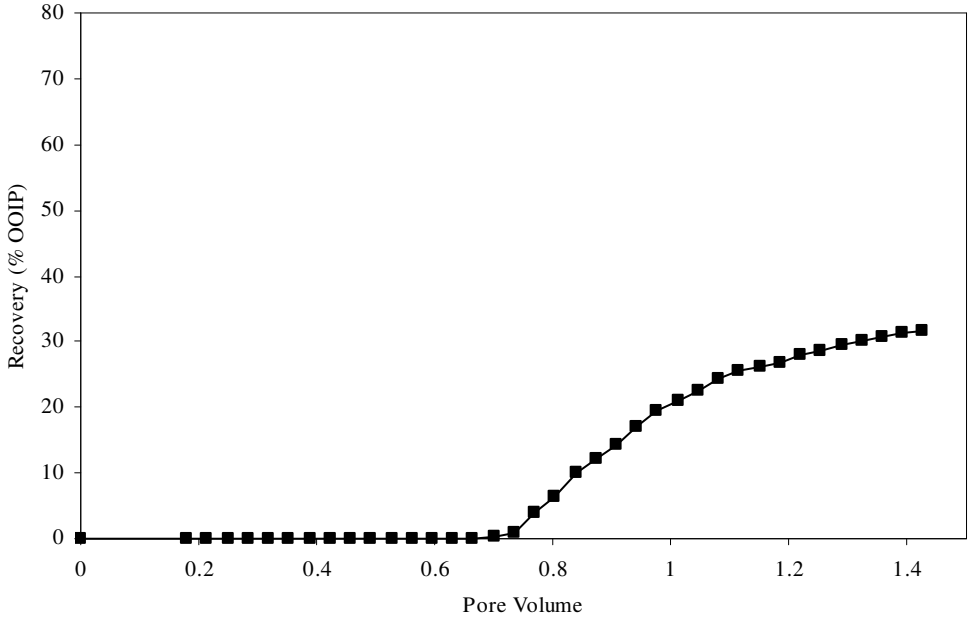

Fig. 4.6– Oil recovery versus pore volume for Run 1.

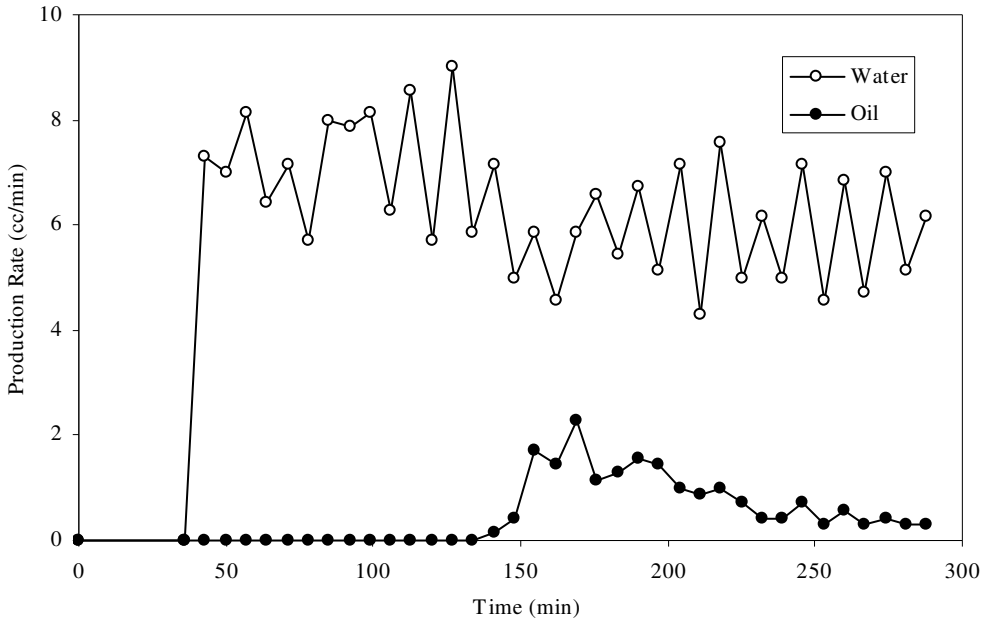

Fig. 4.7– Oil and water rates versus time for Run 1.

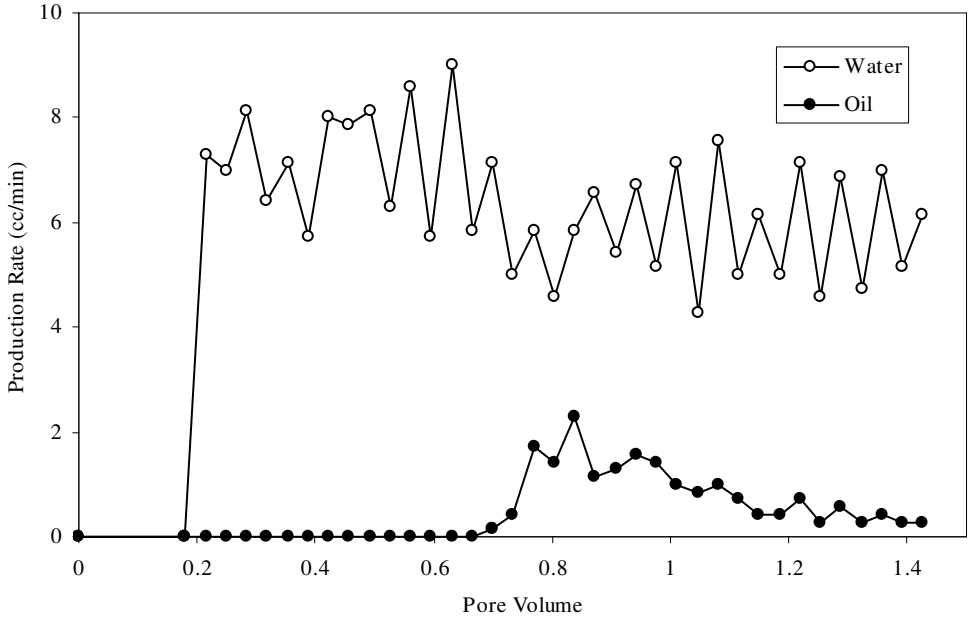

Fig. 4.8– Oil and water rates versus pore volume for Run 1.

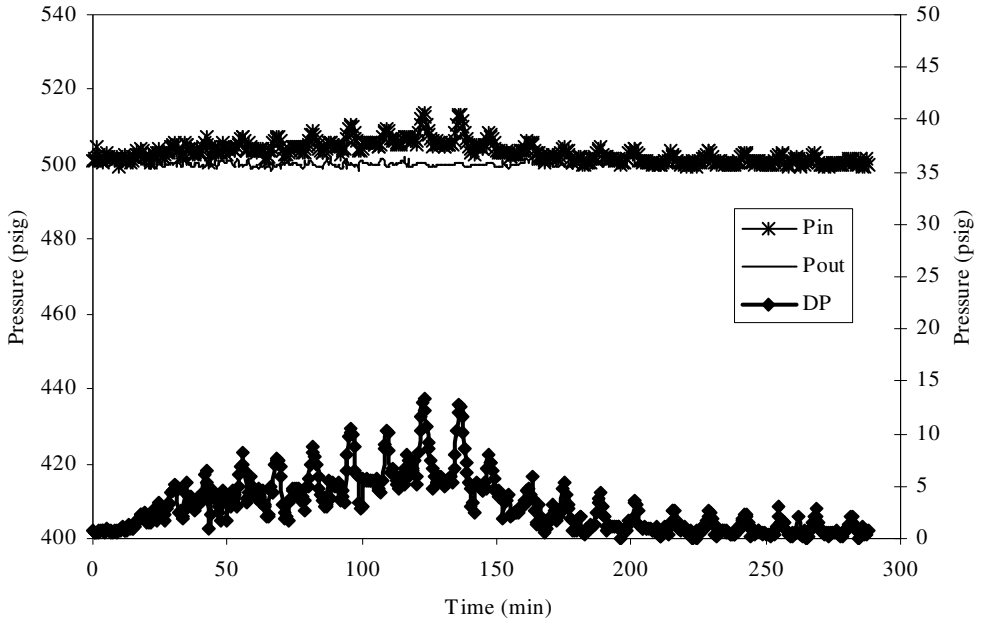

Fig. 4.9– Injection, production and differential pressure for Run 1.

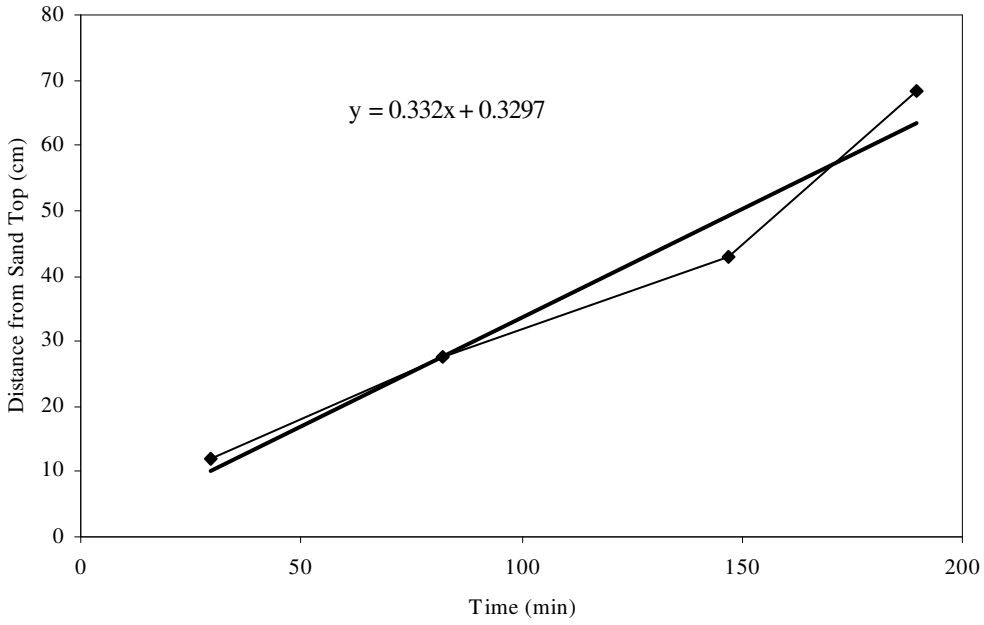

Fig. 4.10– Steam front velocity for Run 1.

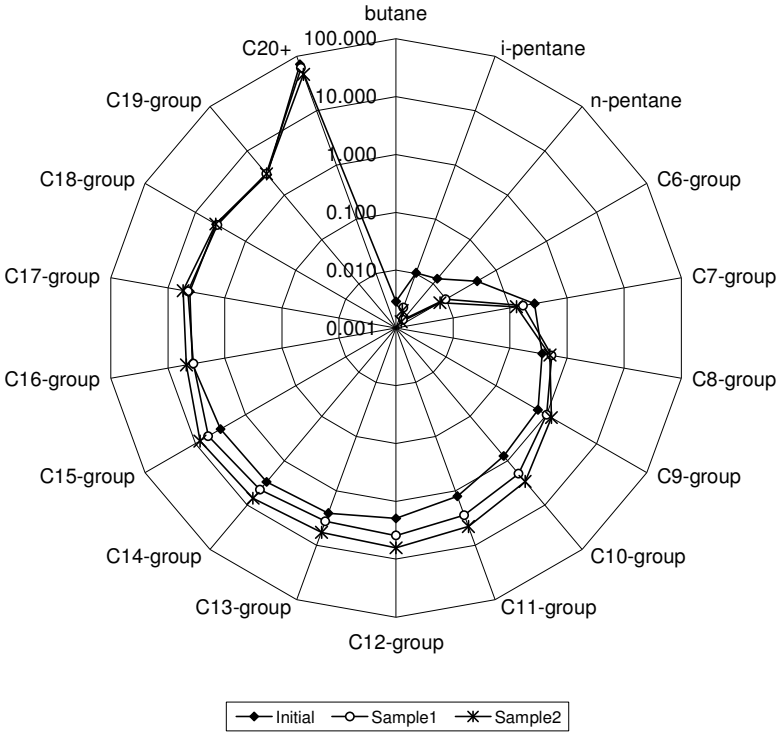

Fig. 4.11– GC analysis for Run 1.

Table 4.2 – Oil properties for Run 1.

	Density g/cc	°API	Viscosity, cp			V, ppm	Ni, ppm	H/C ratio
			30°C	40°C	50°C			
Initial	0.9826	12.37	7832	3071	1434	257.0	86.6	1.62
Sample 1	0.9717	13.97	1490	792	473	228.7	77.7	1.59
Sample 2	0.9523	16.94	243	134	96	197.5	66.7	1.58

4.3 Run 2 (5 wt% Tetralin Injection)

This run consists of injecting a 5 wt% tetralin slug prior to commencing with the steam injection (no catalyst was used).

The average steam injection temperature for this run was 274°C. The temperature profile for the run is shown in **Fig. 4.12** and just like the previous run some oscillation is

observed in the injection temperature. At 200 minutes the saturation temperature (242°C) was reach along the entire cell length as depicted by **Fig. 4.13**.

Figs. 4.14 and **4.15** show the cumulative volumes of oil and water produced throughout the run with respect to time and pore volume. An oil recovery of 44.1% of OOIP was reached at the end of the run (256 min), with a total production of 193 cm^3 (**Fig. 4.16**). The recovery versus pore volume is shown in **Fig. 4.17**. The oil and water rates are shown in **Fig. 4.18** and **Fig. 4.19**. The figures show a peak oil production rate of 2.57 cm^3/min and a peak water production rate of 8.43 cm^3/min.

The production, injection pressures and their corresponding differential pressure are shown in **Fig. 4.20**. The highest differential pressure reached during this run was 16.5 psig after 116 minutes and the average overall differential pressure is 5.8 psig.

The average steam front velocity during this run was calculated as 0.35 cm/min (21 cm/hour) and shown in **Fig. 4.21**. The highest velocity was seen in the second half of the run starting at approximately 140 minutes and continuing until the end of the run.

As can be seen from the GC analysis (**Fig. 4.22**), the produced oil is very similar to the initial oil except for higher percentages of C_9 through C_{15} fractions, and lower quantities of C_{16} to C_{20+} components. A spike in the C_{12} group can also been seen for the two samples, which represents tetralin. Tetralin is a C_{10} component but due to its adhesive nature, the tetralin adheres to the column and its retention time is prolonged. This phenomenon is common for components with a benzene ring structure. The tetralin will be represented within the C_{12} group throughout the GC analysis in this study.

The properties of the initial oil and produced samples for this run are shown in **Table 4.3**. The table compares the initial, produced and original crude oil with a 5 wt% tetralin. The oil gravity increased by 2.56° API. Both the viscosity and density decreased with time. The average decrease in vanadium and nickel was 26% and 24% respectively. Hydrogen to carbon ratio showed a slight drop for sample one then an increase for sample 2.

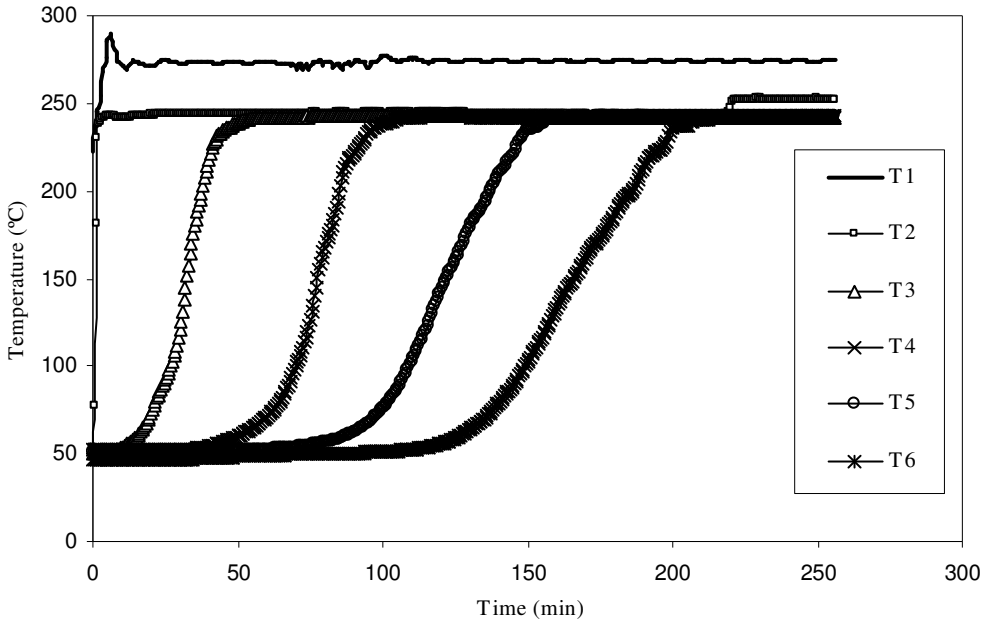

Fig. 4.12– Temperature profile versus time for Run 2.

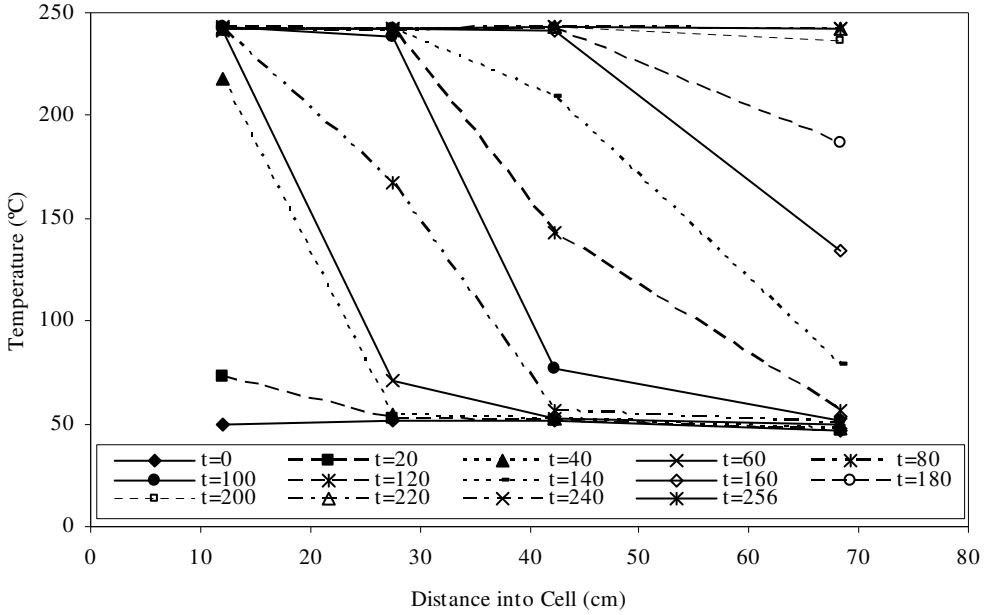

Fig. 4.13– Temperature profiles at 20 min intervals for Run 2.

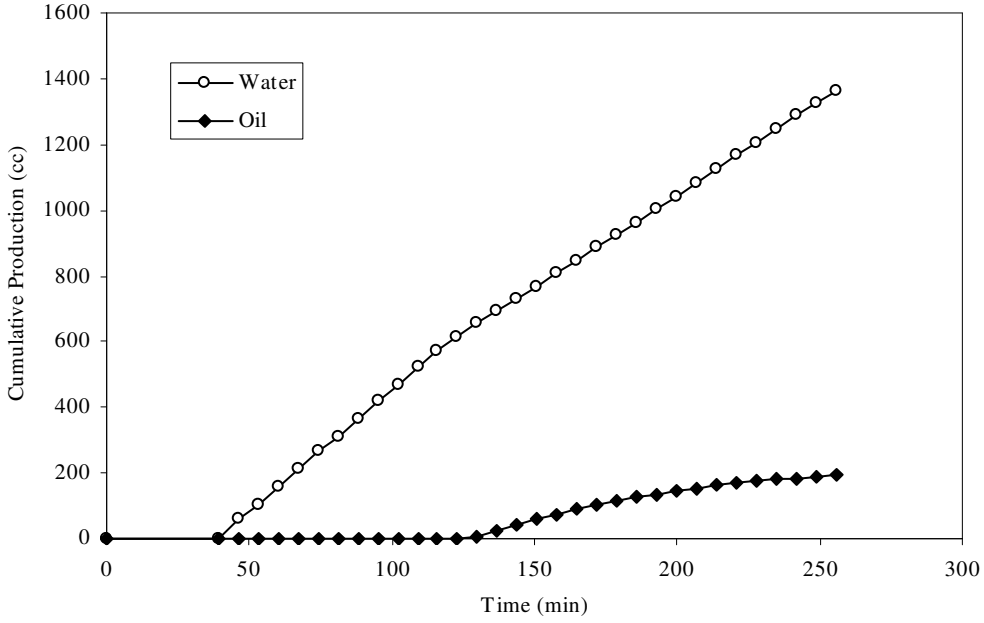

Fig. 4.14– Cumulative oil and water production versus time for Run 2.

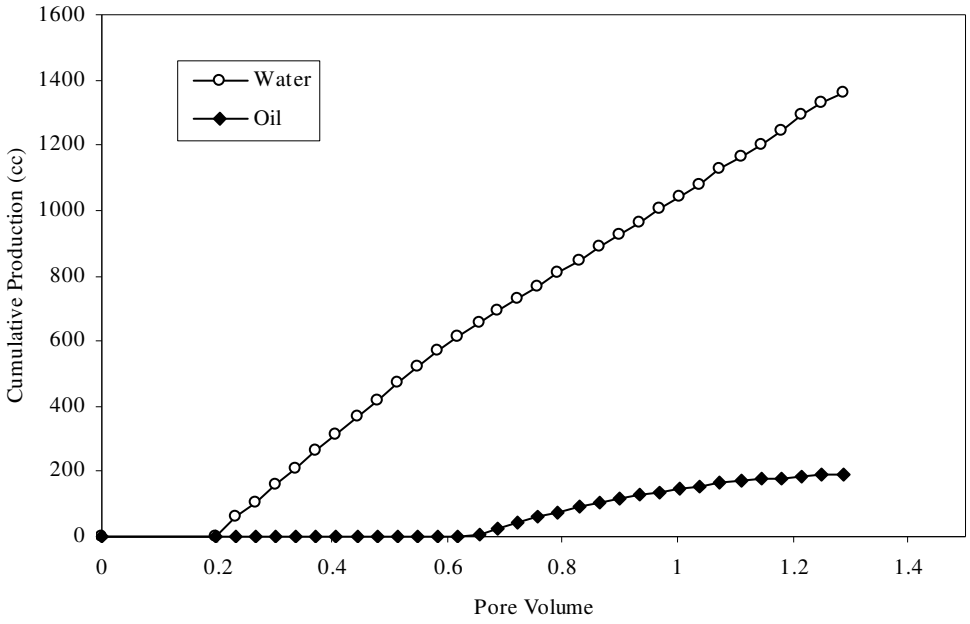

Fig. 4.15– Cumulative oil and water production versus pore volume for Run 2.

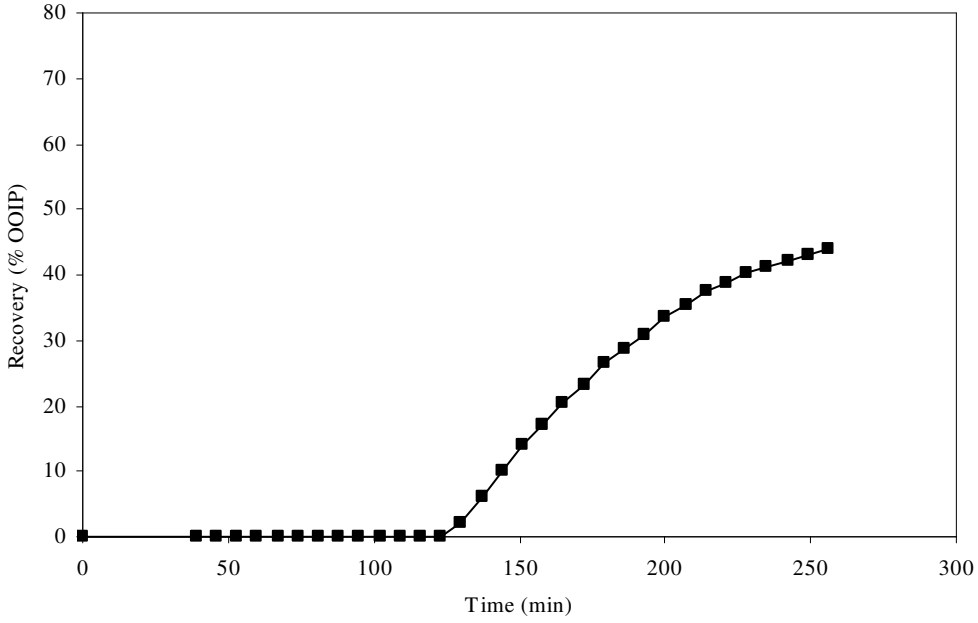

Fig. 4.16– Oil recovery versus time for Run 2.

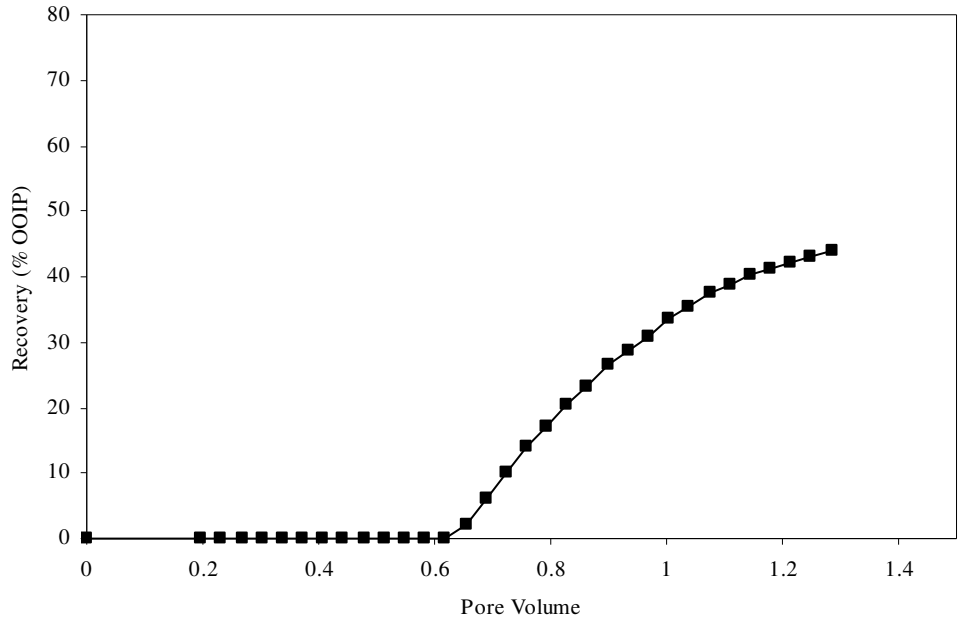

Fig. 4.17– Oil recovery versus pore volume for Run 2.

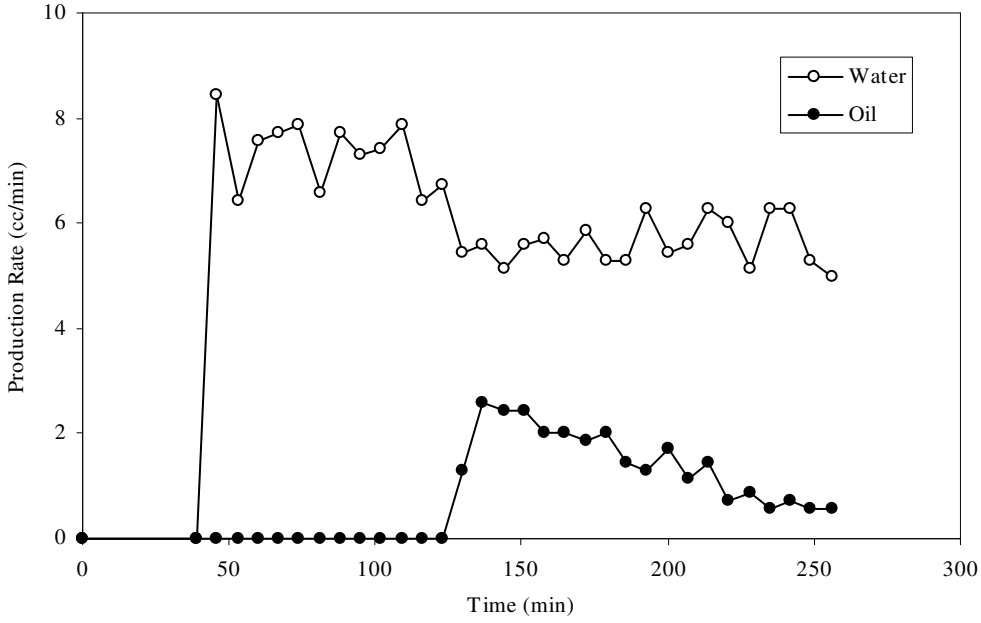

Fig. 4.18– Oil and water rates versus time for Run 2.

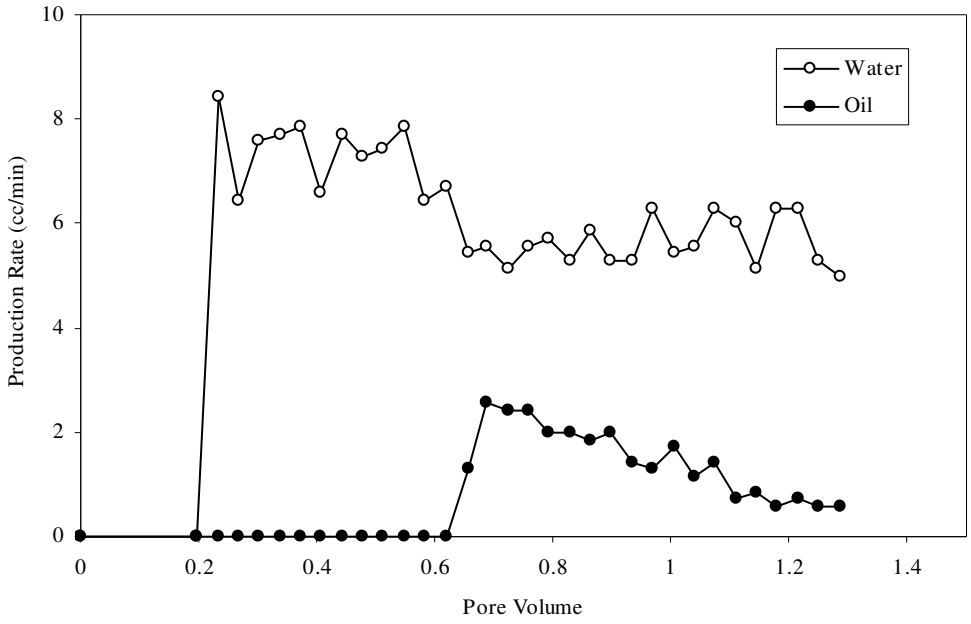

Fig. 4.19– Oil and water rates versus pore volume for Run 2.

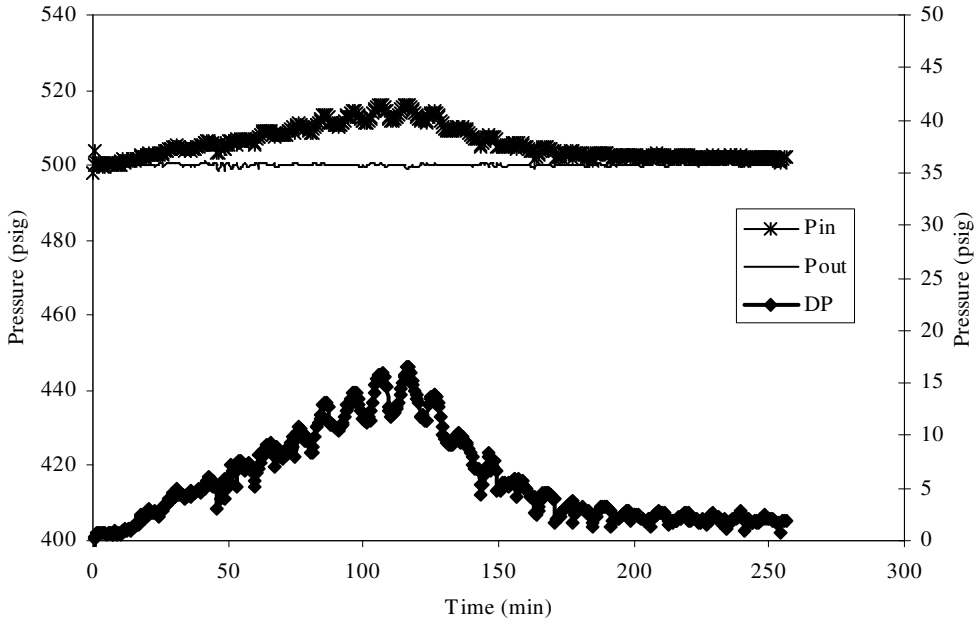

Fig. 4.20– Injection, production and differential pressure for Run 2.

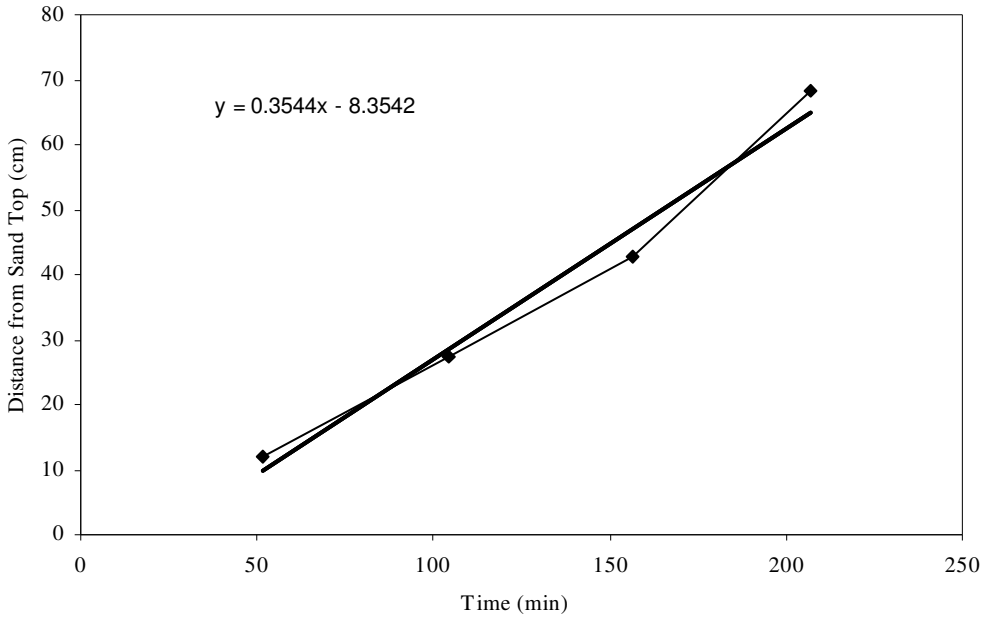

Fig. 4.21– Steam front velocity for Run 2.

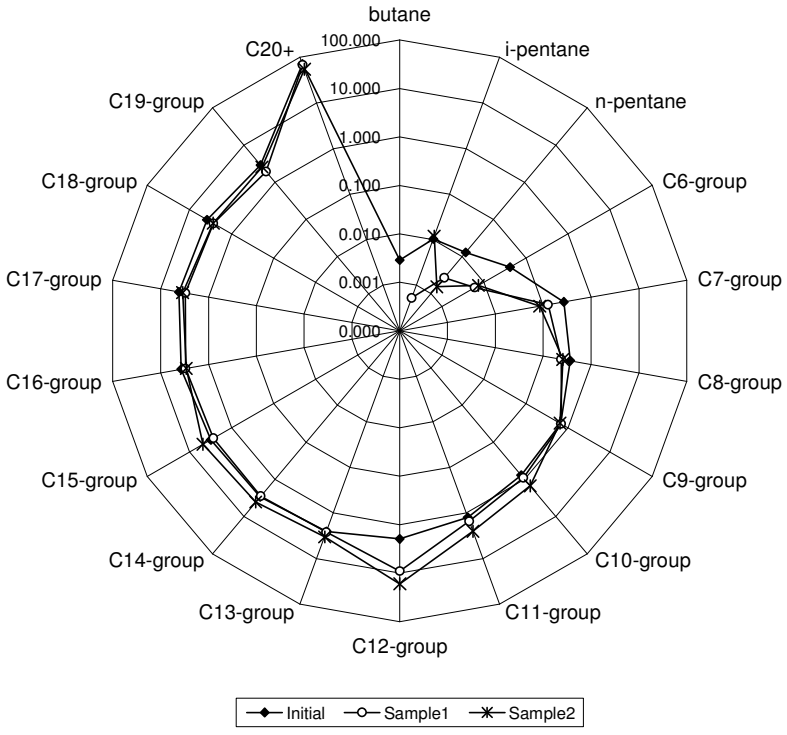

Fig. 4.22– GC analysis for Run 2.

Table 4.3– Oil properties for Run 2.

	Density g/cc	°API	Viscosity, cp			V, ppm	Ni, ppm	H/C ratio
Initial	0.9826	12.37	7832	3071	1434	257.0	86.6	1.62
5% Tetralin	0.9821	12.43	2869	1303	694	244.1	82.3	1.56
Sample 1	0.9769	13.2	829	475	278	195.1	63.6	1.59
Sample 2	0.9654	14.93	232	156	92	186.2	68.8	1.67

4.4 Run 3 (5 wt% Pre-mixed Tetralin)

This is a pre-mixed run where 5 wt% tetralin is mixed with the sand, water and oil mixture and then tamped into the injection cell.

The temperature profile for this run is shown in **Fig. 4.23.** The average steam injection temperature is 274°C. Oscillation in the steam injection temperature is observed due to the combination of the temperature controllers. From **Fig. 4.24,** it can be seen that at 200 minutes the temperature inside the whole length of the injection cell was approximately 242°C (saturation temperature).

Cumulative produced volumes of the oil and water with respect to time and pore volume are illustrated in **Fig. 4.25** and **Fig. 4.26**. The total oil produced at the end of the run (255 minutes) was 184 cm^3 representing 43.5% of the original oil in place. The recovery versus time and pore volume are plotted in **Fig. 4.27 and Fig. 4.28** respectively. The oil and water rates are plotted against time and pore volume in **Fig. 4.29** and **Fig. 4.30**. The peak oil production rate was 2.43 cm^3/min, whereas the peak water rate was 8.14 cm^3/min.

The production, injection and differential pressures and shown in **Fig. 4.31**. The production pressure is maintained at 500 psig during the entire run. The maximum

differential pressure reached was 12.8 psig and the average differential pressure for the entire run was 4.9 psig.

Fig. 4.32 shows the steam front velocity plot. The run shows a more or less constant velocity but at roughly 160 minutes the velocity increased above average until the end of the run. The average steam front velocity for the entire run was calculated as 0.36 cm/min (21.6 cm/hour).

As can be seen from **Fig. 4.33** (GC analysis), the produced oil is very similar to the initial oil except for a slightly higher percentage of C_9 to C_{17} components, and lower quantities of C_{18} to C_{20+} groups.

Oil properties for this run are shown in **Table 4.4**. The table compares the initial oil (5 wt% tetralin + crude), the produced samples and original crude oil (Jobo). The oil gravity increased by 2.36° API between the initial oil and the second oil sample. Both the viscosity and density decreased with time. The average decrease in vanadium and nickel was 28% and 30% respectively. Hydrogen to carbon ratio showed an increase for both samples.

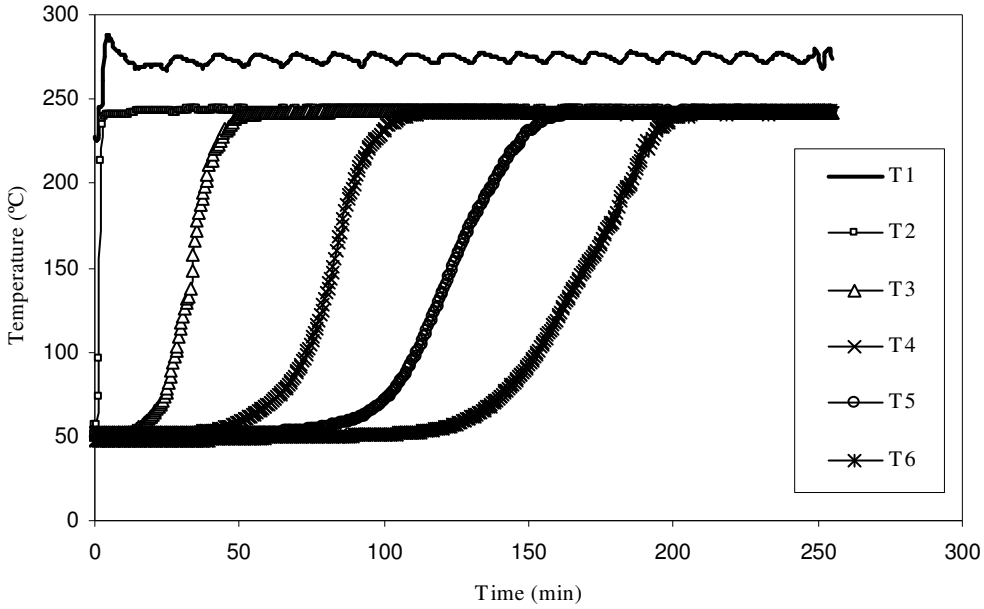

Fig. 4.23– Temperature profile versus time for Run 3.

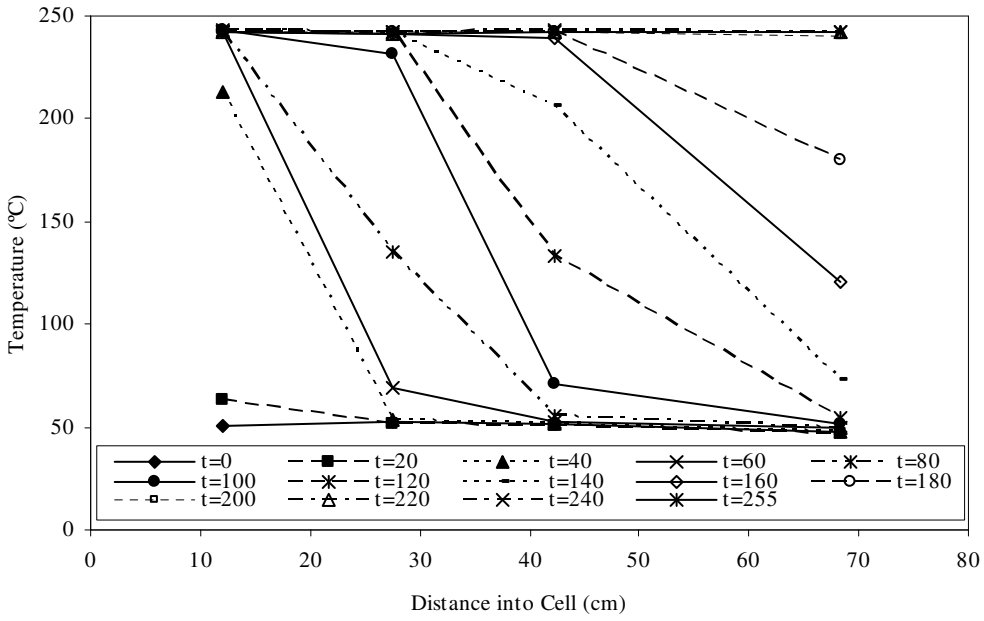

Fig. 4.24– Temperature profiles at 20 min intervals for Run 3.

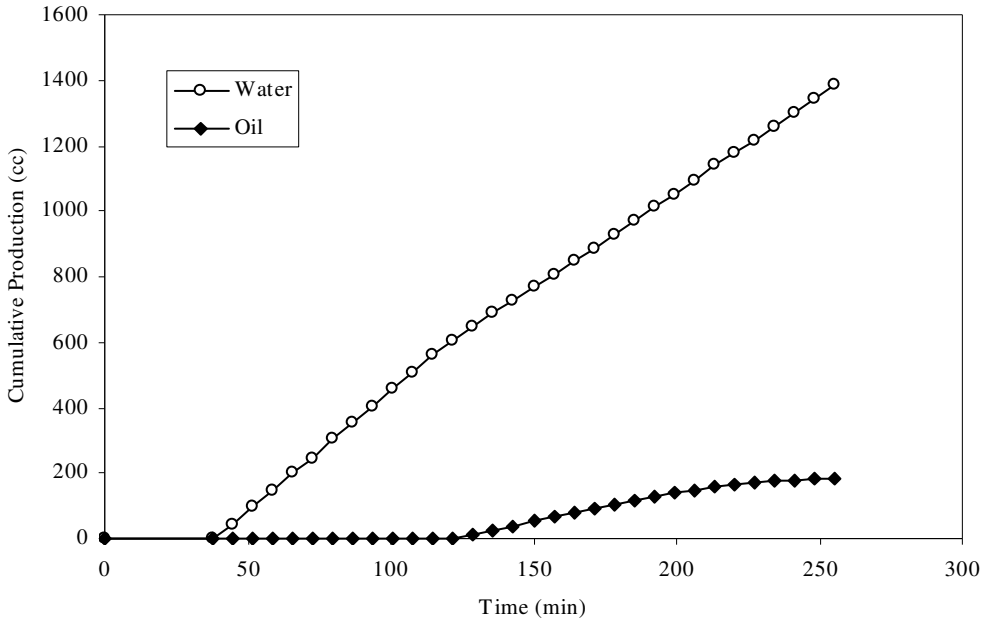

Fig. 4.25– Cumulative oil and water production versus time for Run 3.

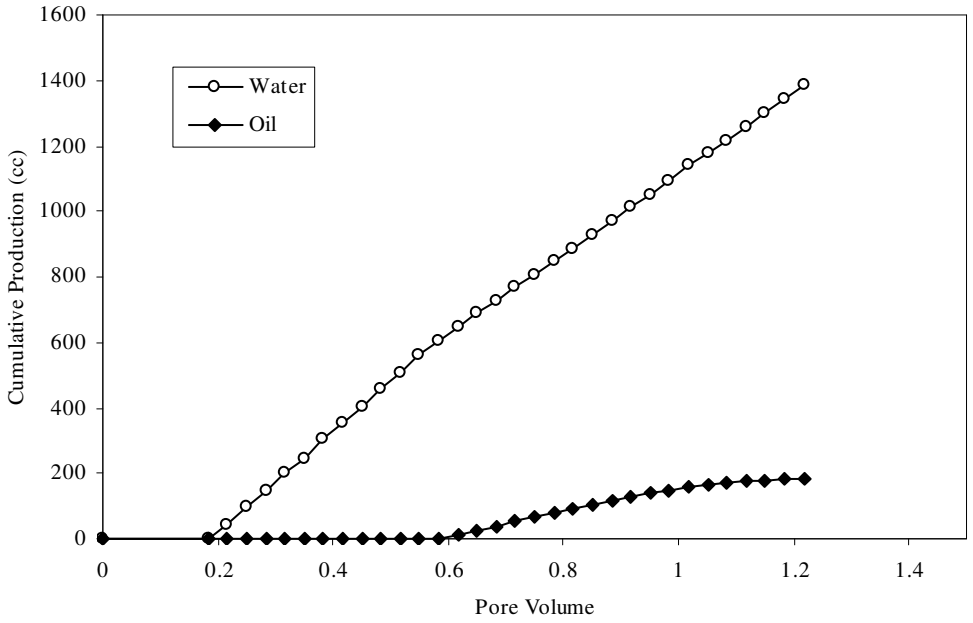

Fig. 4.26– Cumulative oil and water production versus pore volume for Run 3.

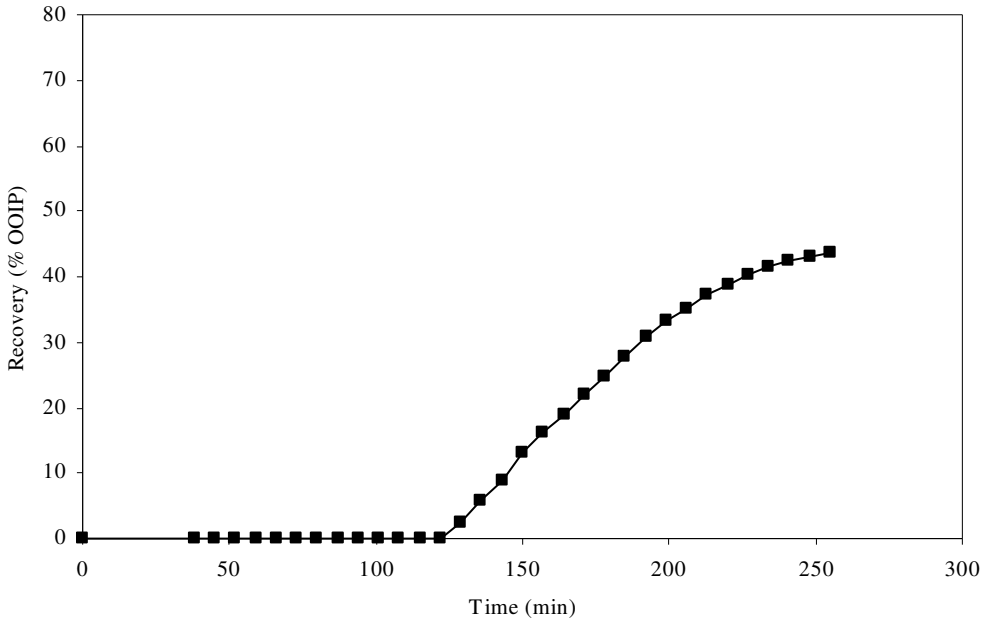

Fig. 4.27– Oil recovery versus time for Run 3.

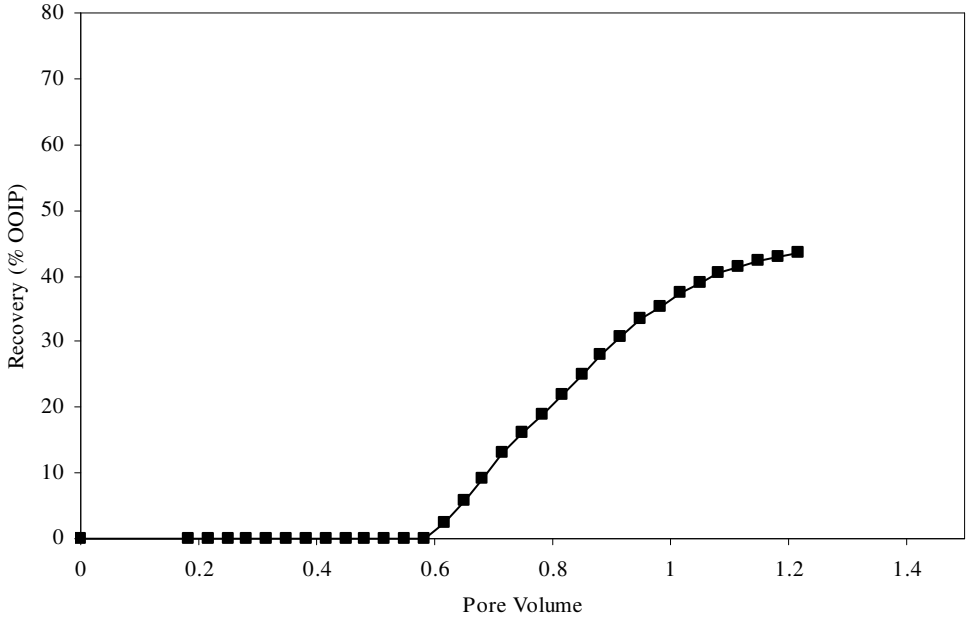

Fig. 4.28– Oil recovery versus pore volume for Run 3.

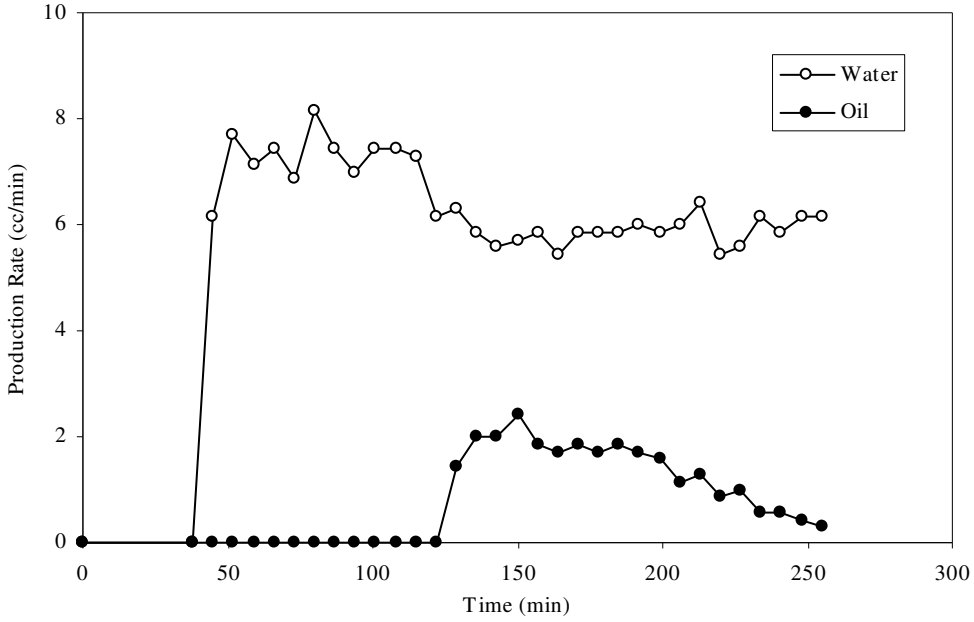

Fig. 4.29– Oil and water rates versus time for Run 3.

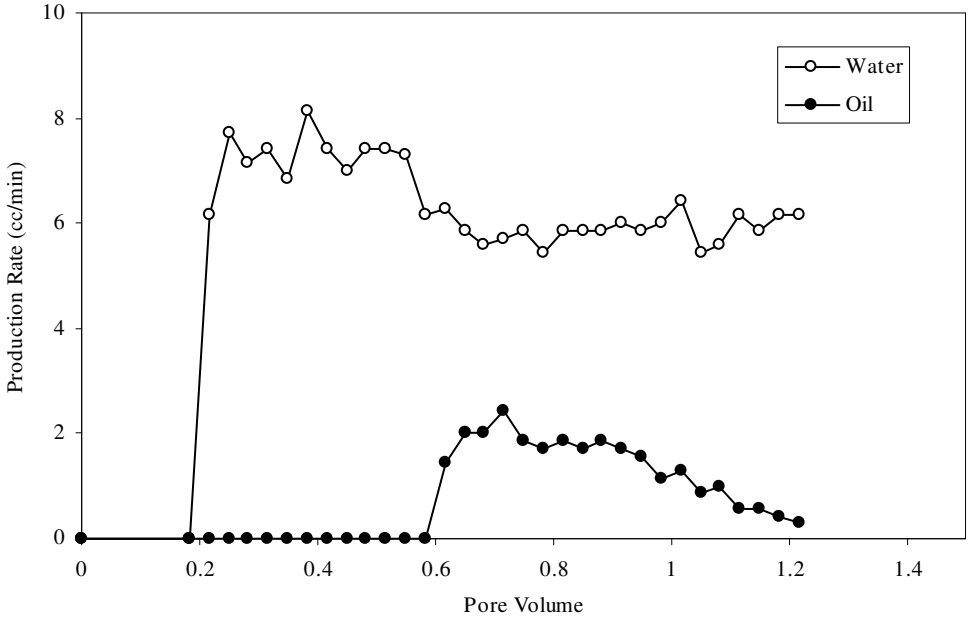

Fig. 4.30– Oil and water rates versus pore volume for Run 3.

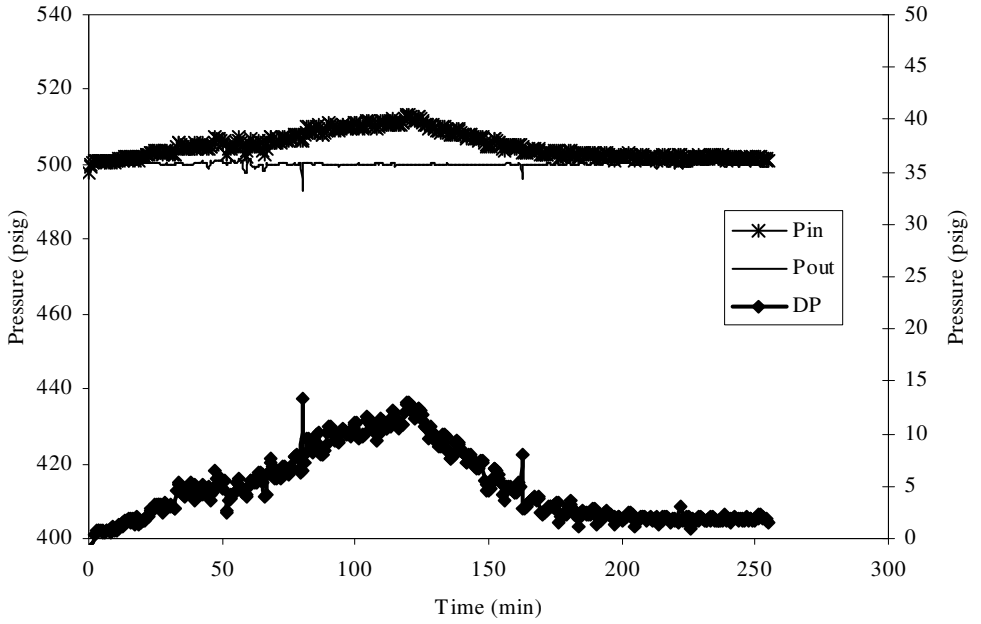

Fig. 4.31– Injection, production and differential pressure for Run 3.

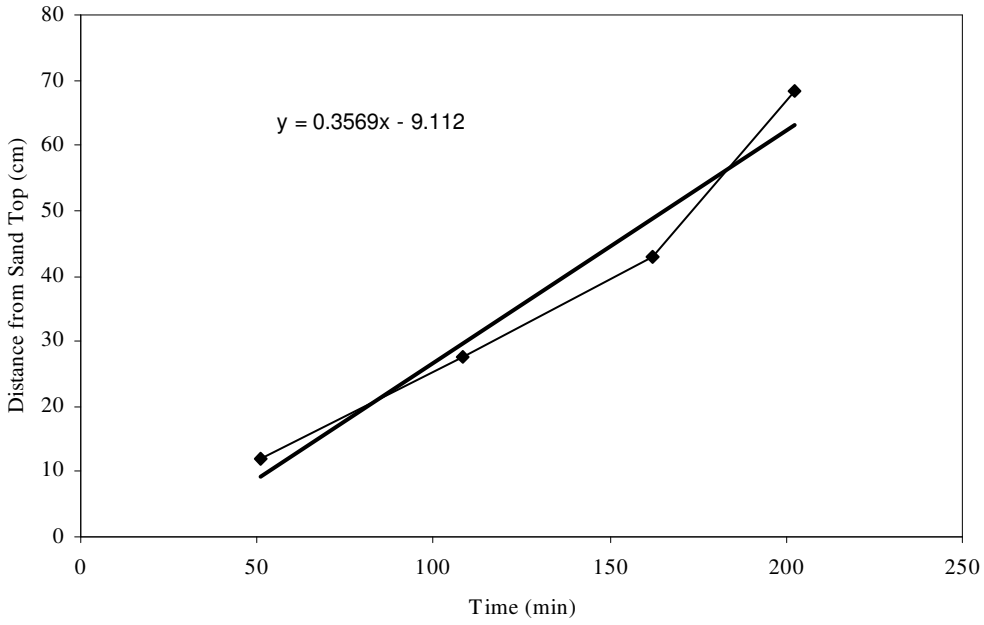

Fig. 4.32– Steam front velocity for Run 3.

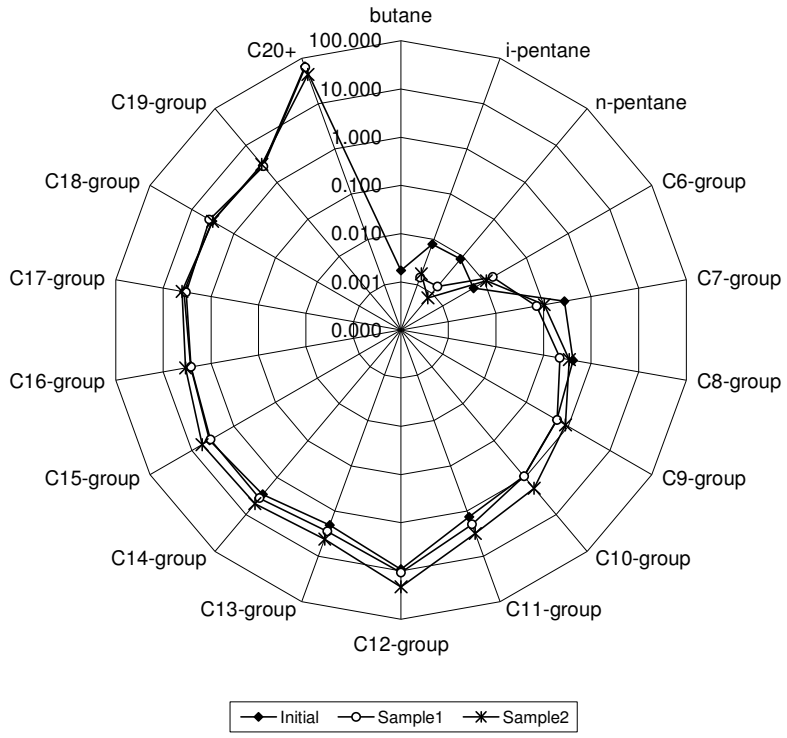

Fig. 4.33– GC analysis for Run 3.

Table 4.4– Oil properties for Run 3.

	Density g/cc	°API	Viscosity, cp			V, ppm	Ni, ppm	H/C ratio
Original	0.9826	12.37	7832	3071	1434	257.0	86.6	1.62
Initial	0.9821	12.43	2869	1303	694	244.1	82.3	1.56
Sample 1	0.9764	13.28	932	573	311	199.4	64.9	1.64
Sample 2	0.9663	14.79	263	176	99	172.0	57.2	1.63

4.5 Run 4 (15 wt% Tetralin Injection)

This run consists of injecting a 15 wt% tetralin slug with no catalyst prior to commencing steam injection.

The average steam injection temperature for this run was 275°C. The temperature profile for this run is shown in **Fig. 4.34**. No steam injection temperature oscillation behavior was observed in this run. The temperature throughout the injection cell reached saturation temperature just after 180 minutes as shown in **Fig. 4.35**.

Illustrated in **Fig. 4.36** and **Fig. 4.37** are the cumulative produced volumes of oil and water with respect to time and pore volume. The total produced oil was 320 cm^3 at the end of the run (255 min). The produced oil resulted in a 67% recovery of the OOIP. The complete recovery profile is shown in **Fig. 4.38** and **Fig. 4.39** versus time and pore volume. The peak oil and water rates were 3.14 cm^3/min and 8.0 cm^3/min respectively (**Fig. 4.40** and **Fig. 4.41**).

The maximum and average differential pressures were 26.1 psig and 8.1 psig respectively. The pressure profile for this run is shown in **Fig. 4.42**.

The steam front velocity in shown in **Fig. 4.43**, and the average velocity was calculated as 0.39 cm/min (23.4 cm/hour). The velocity dropped below average between 100 and 140 minutes, and then increased above average until the end of the run. This seems to be the trend for most of the runs.

The spider chart (**Fig. 4.44**) represents the GC analysis for run 4. The chart shows the produced oil samples vary slightly to that of the initial oil. The samples show slightly higher percentages of C_{10}, C_{11}, and C_{13} to C_{15} fractions, but considerably higher C_{12} components than the initial oil. The C_{12} spike represents the injected tetralin. The produced oil samples also show lower quantities of the heavier fractions (C_{16} to C_{20+}) then those in the initial oil.

Table 4.5 shows the oil properties of the initial and produced oil samples. The oil gravity overall increase was 1.75° API. The viscosity decrease was very significant unlike the marginal density reduction. This demonstrates the viscosity reduction influence of tetralin. The average reduction in heavy metal content was 34% and 36% for vanadium and nickel respectively.

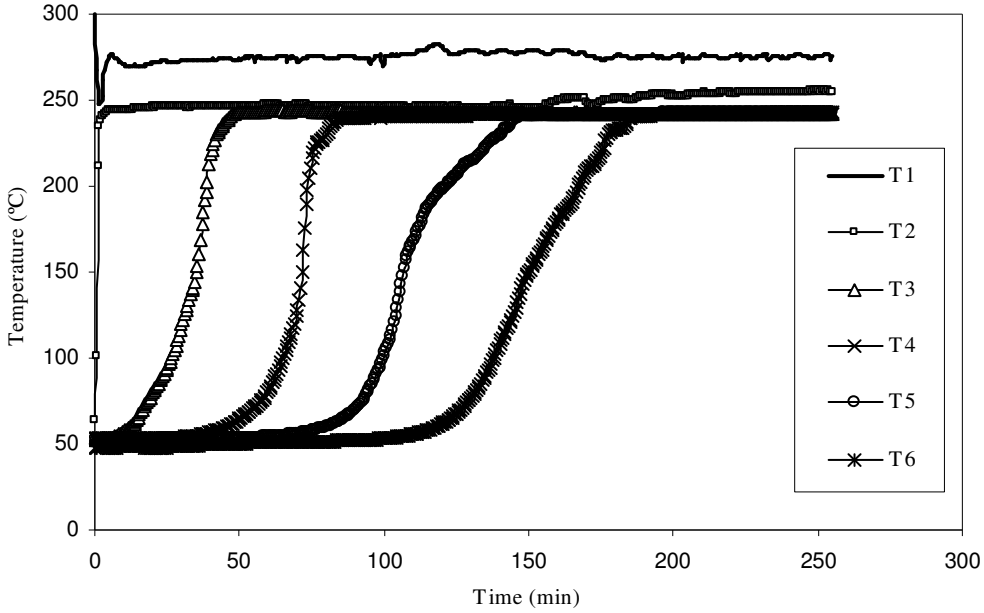

Fig. 4.34– Temperature profile versus time for Run 4.

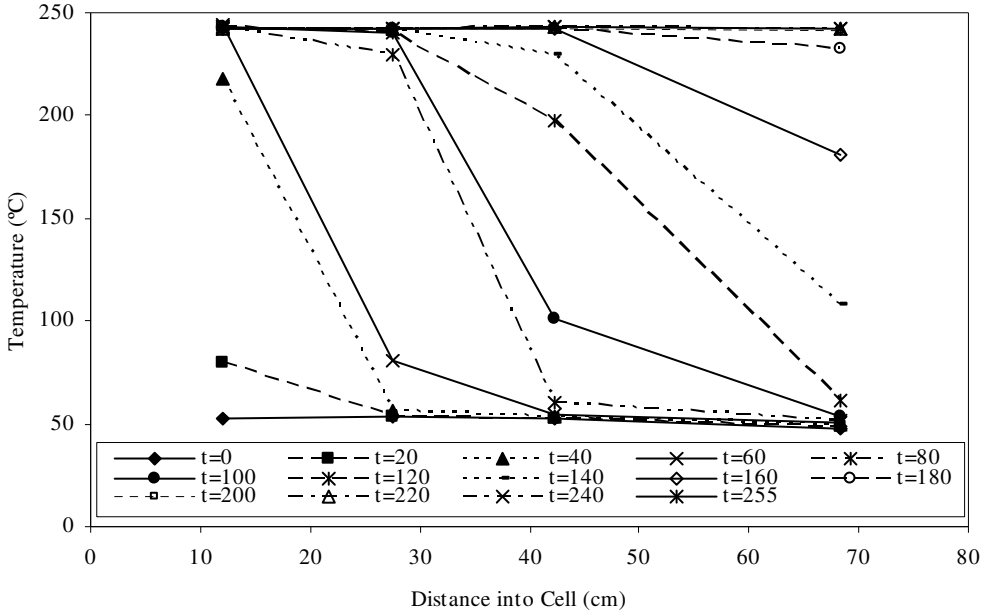

Fig. 4.35– Temperature profiles at 20 min intervals for Run 4.

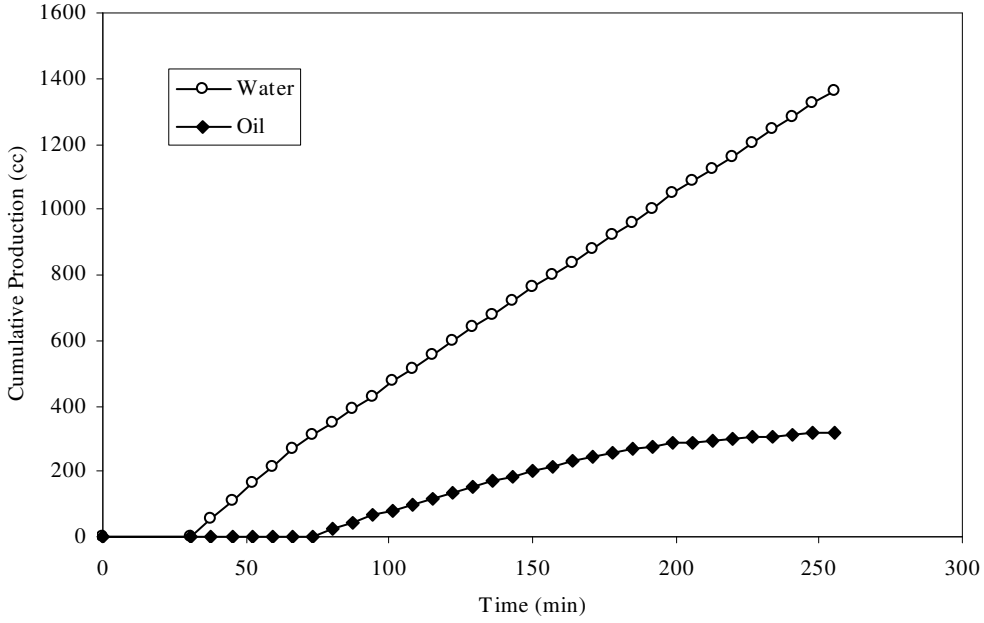

Fig.4.36– Cumulative oil and water production versus time for Run 4.

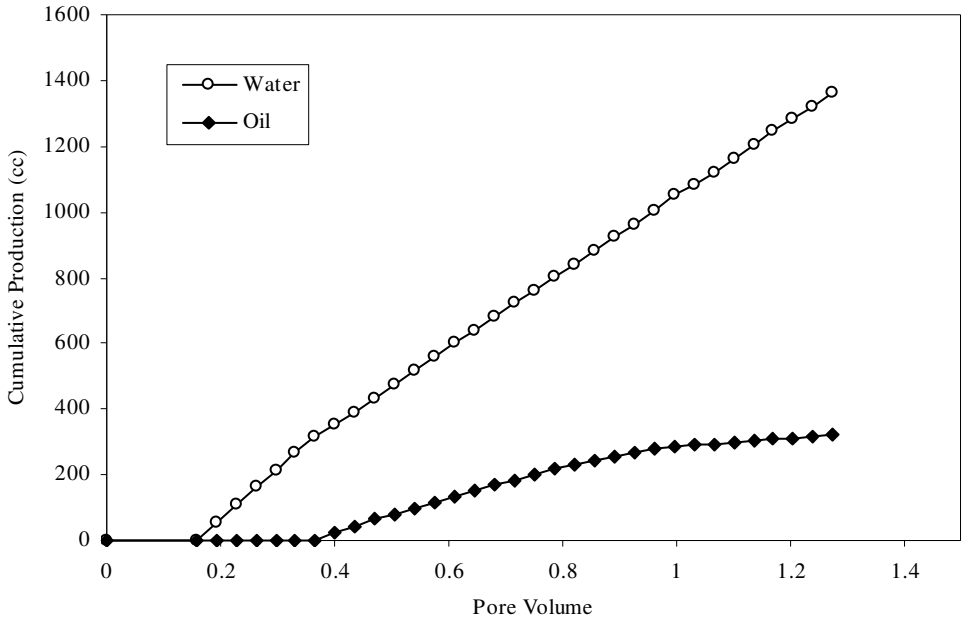

Fig. 4.37– Cumulative oil and water production versus pore volume for Run 4.

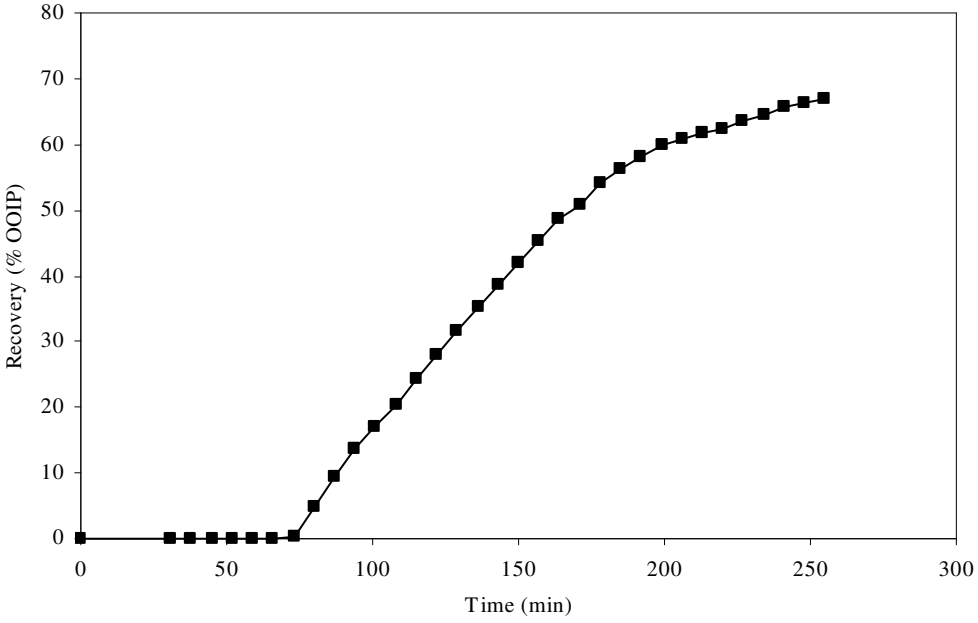

Fig. 4.38– Oil recovery versus time for Run 4.

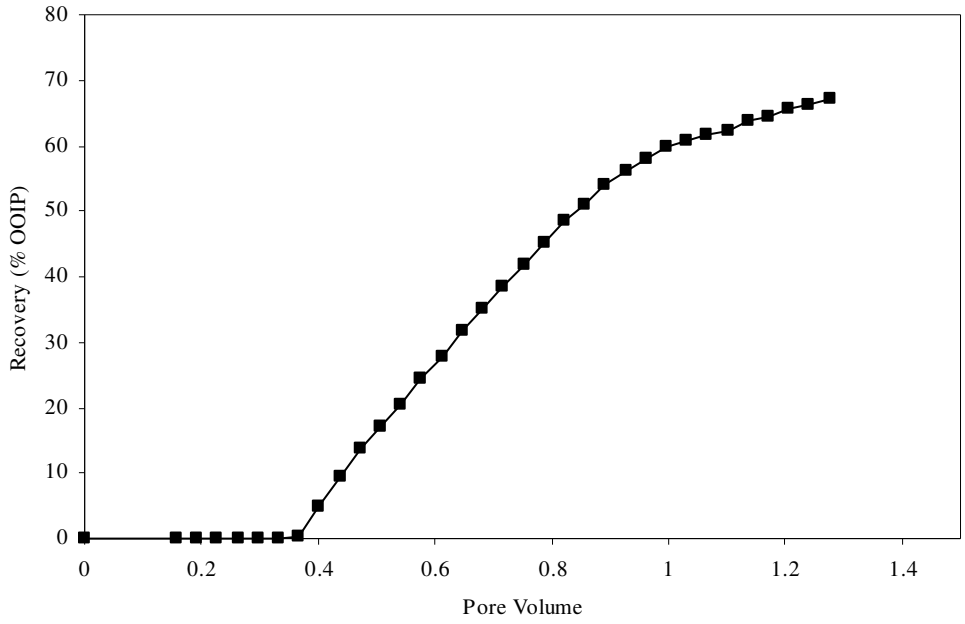

Fig. 4.39– Oil recovery versus pore volume for Run 4.

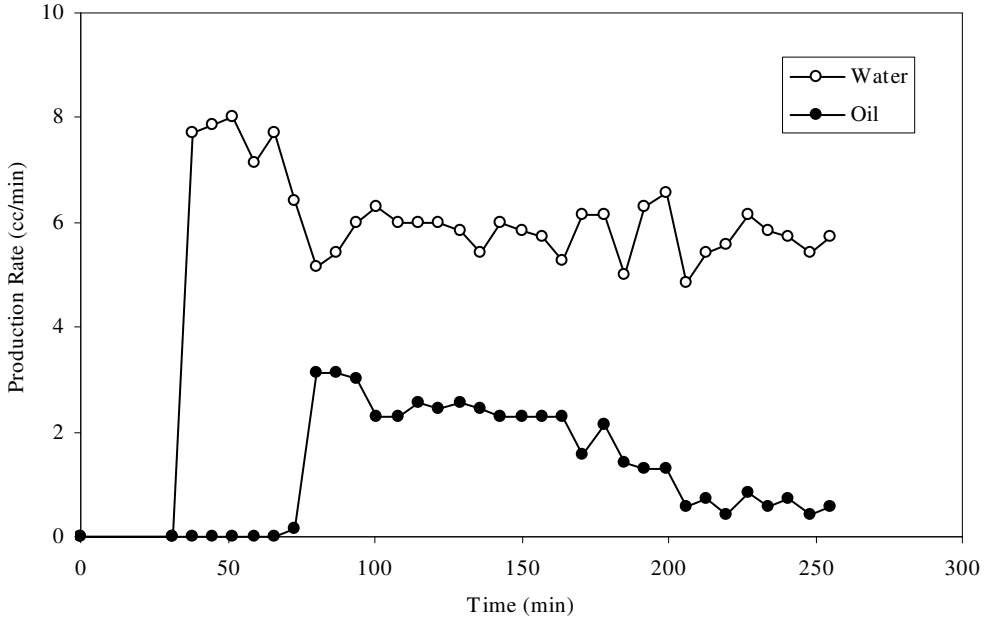

Fig. 4.40– Oil and water rates versus time for Run 4.

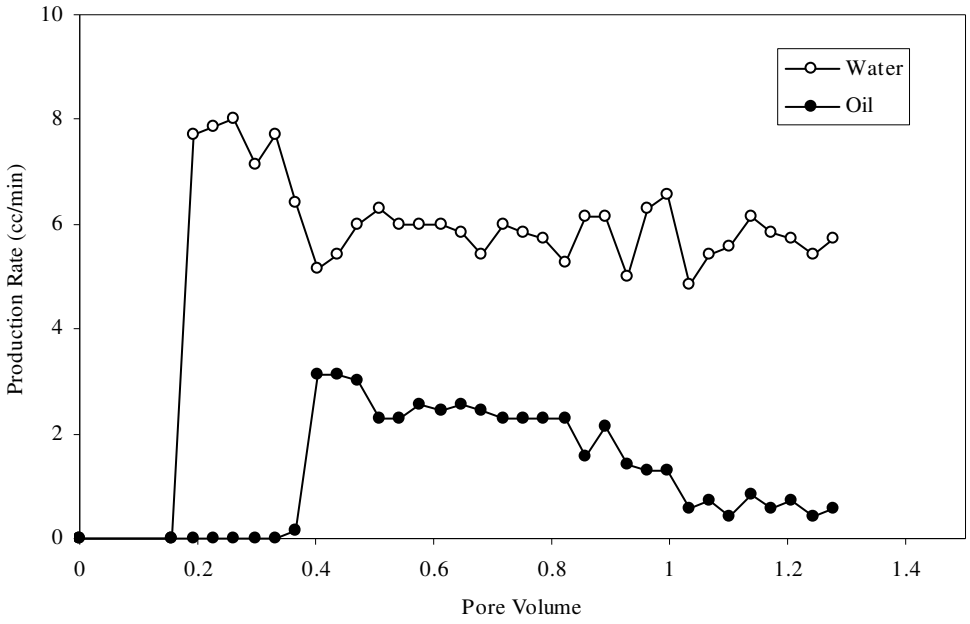

Fig. 4.41– Oil and water rates versus pore volume for Run 4.

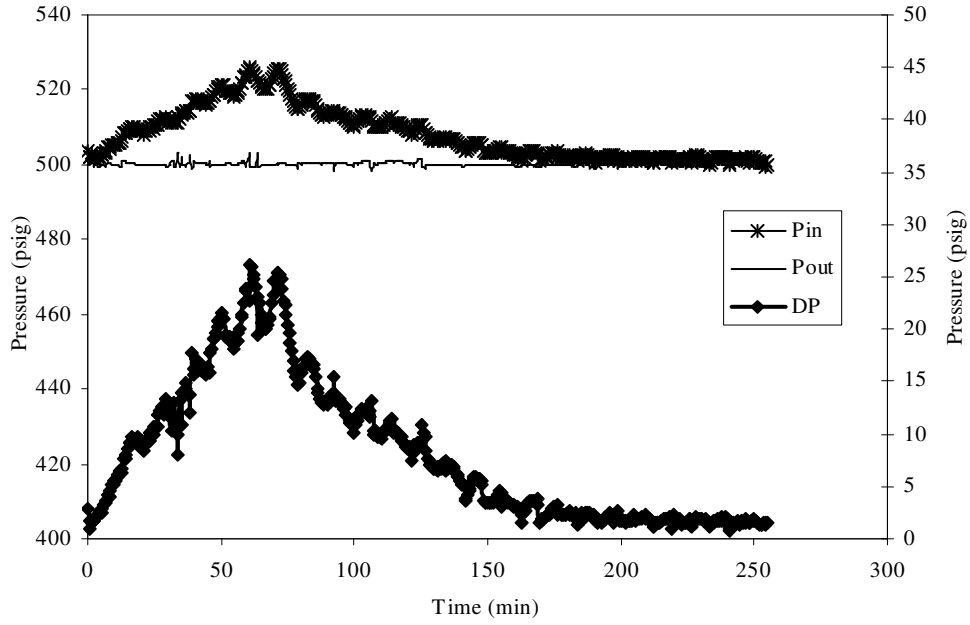

Fig. 4.42– Injection, production and differential pressure for Run 4.

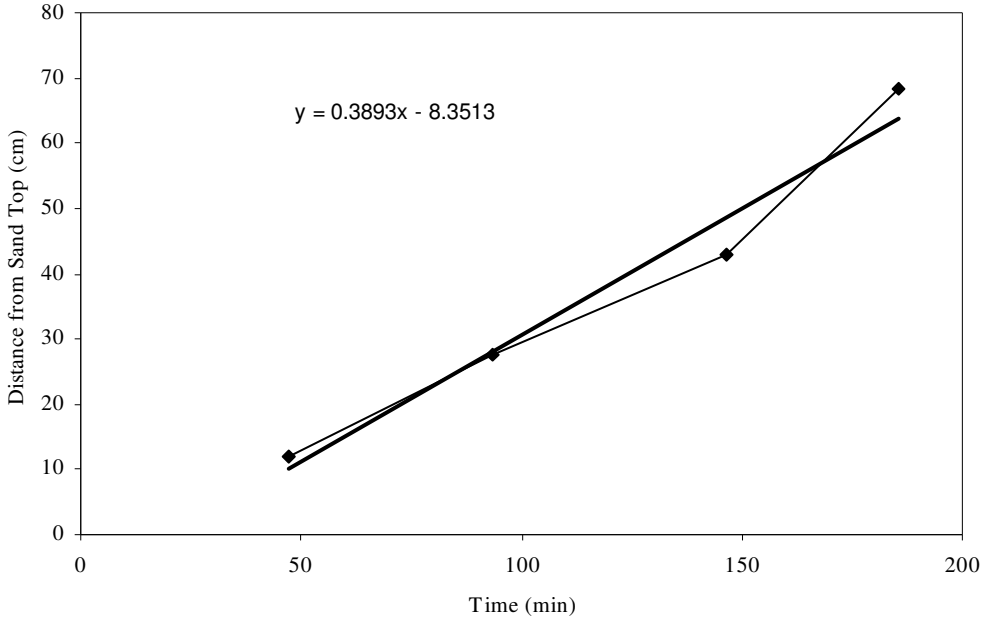

Fig. 4.43– Steam front velocity for Run 4.

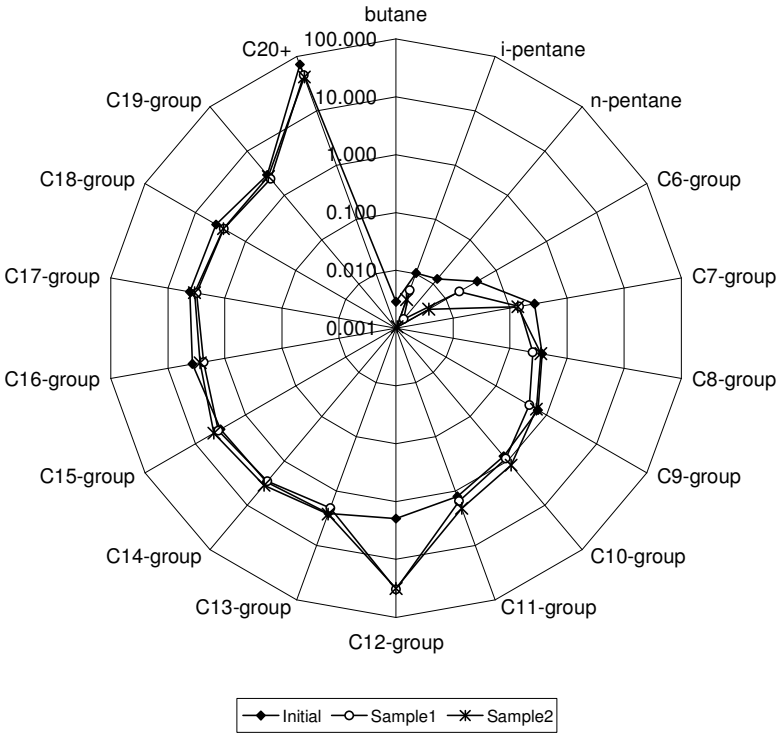

Fig. 4.44– GC analysis for Run 4.

Table 4.5– Oil properties for Run 4.

	Density g/cc	°API	Viscosity, cp			V, ppm	Ni, ppm	H/C ratio
Initial	0.9826	12.37	7832	3071	1434	257.0	86.6	1.62
Sample 1	0.9788	12.93	181	122	78	182.2	59.7	1.54
Sample 2	0.9707	14.12	111	76	54	157.1	50.8	1.58

4.6 Run 5 (5 wt% Tetralin-Catalyst Injection)

This run consists of injecting a 5 wt% tetralin-catalyst solution as a slug. The concentration of catalyst ($Fe(acac)_3$) in the tetralin is 750 ppm. The solution is injected as a slug prior to steam injection.

The average steam injection temperature for this run was 273°C as can be established from the temperature profile (**Fig. 4.45**). Steam injection temperature oscillation behavior was observed in the later part of the run. The temperature throughout the injection cell reached saturation temperature at 200 minutes as illustrated in **Fig. 4.46**.

Shown in **Fig. 4.47** and **Fig. 4.48** are the cumulative produced volumes of oil and water with respect to time and pore volume. The total produced oil was 184 cm^3 at the end of the run (256 min). This resulted in a 42.3% oil recovery of the OOIP. The complete recovery profile can be seen in **Fig. 4.49** and **Fig. 4.50** with respect to time and pore volume. The maximum oil and water rates were determined from **Fig. 4.51** and **Fig. 4.52**. The peak produced rates for oil and water were 2.29 cm^3/min and 8.14 cm^3/min respectively.

The maximum and average differential pressures for this run were 13.7 psig and 6.1 psig respectively. The pressure profile is shown in **Fig. 4.53**.

The steam front velocity is plotted in **Fig. 4.54**. The average steam front velocity was computed as 0.33 cm/min (19.8 cm/hour). The front velocity dropped below average between 110 – 130 minutes, and later at 150 minutes increased above average velocity for the remainder of the run.

Fig. 4.55 shows the GC analysis chart for the initial and produced oil samples. The produced oil showed slightly greater quantities of C_9 to C_{17} components, and lower quantities of the heavier C_{18} to C_{20+} fractions.

Table 4.6 shows the oil properties of the initial and produced oil samples. The API gravity tends to increased with time and showed an increase of 2.71° API. The viscosity decrease was significant as was the reduction in density. The average heavy metal content reduction was 26% for vanadium and 30% for nickel. The hydrogen to carbon ratio was lower for both samples by only 0.01.

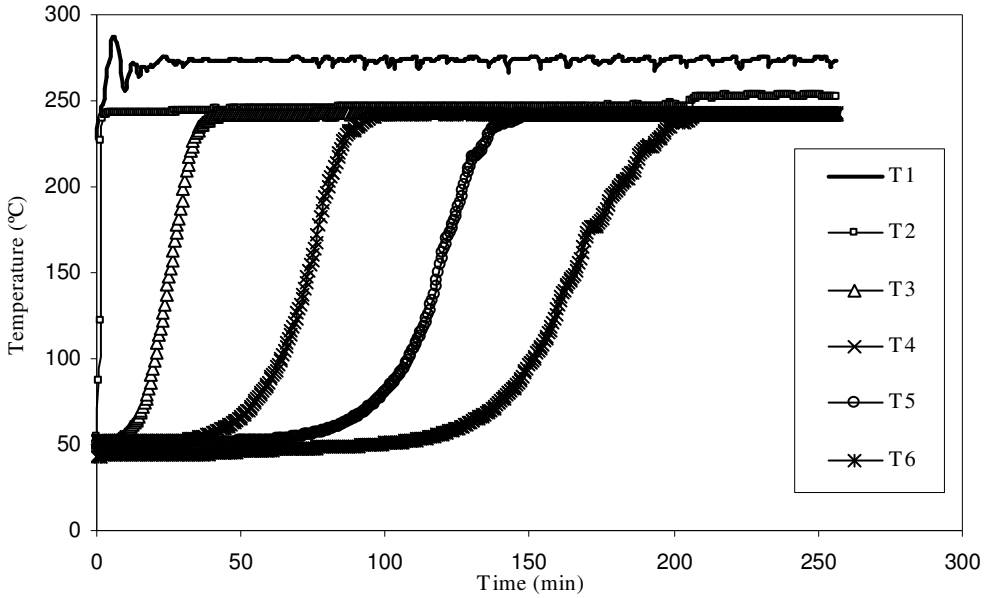

Fig. 4.45– Temperature profiles versus time for Run 5.

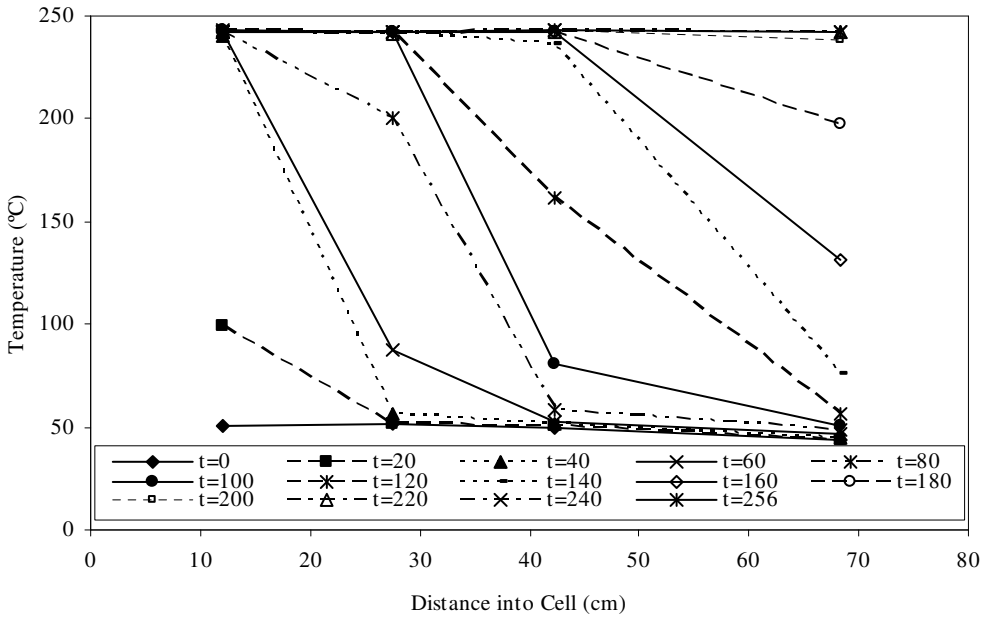

Fig. 4.46– Temperature profiles at 20 min intervals for Run 5.

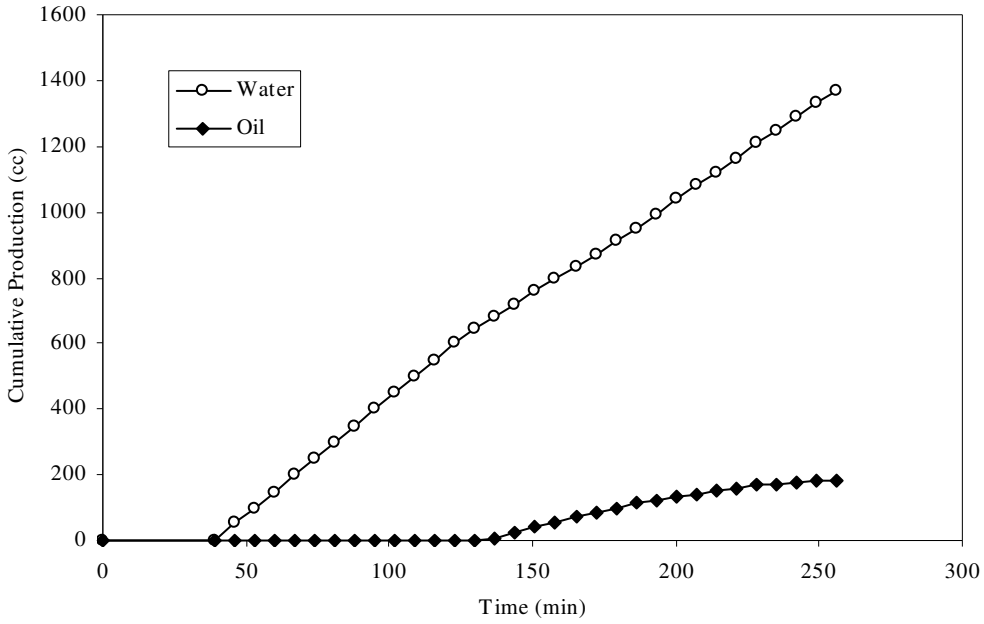

Fig. 4.47– Cumulative oil and water production versus time for Run 5.

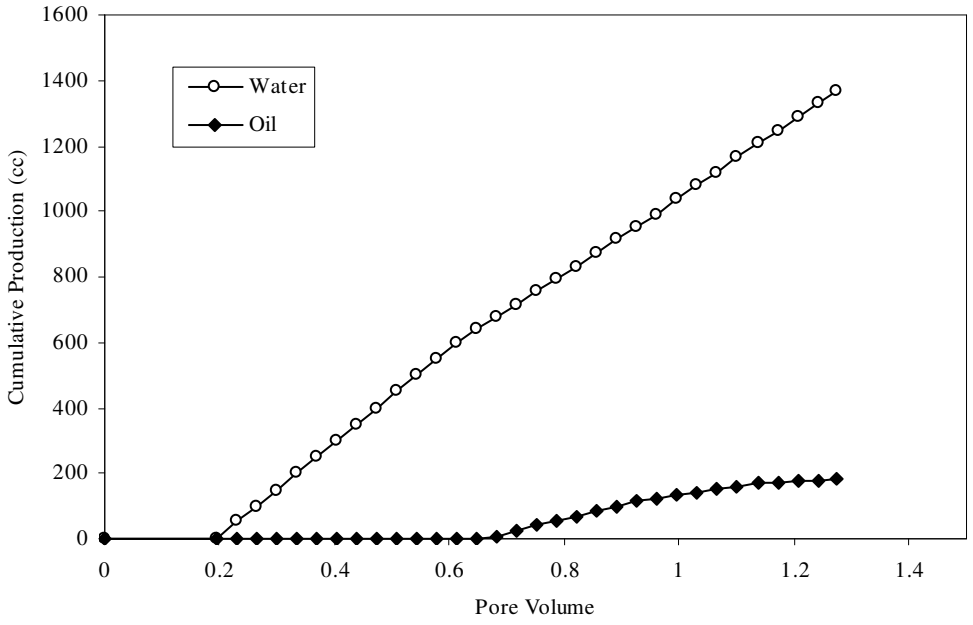

Fig. 4.48– Cumulative oil and water production versus pore volume for Run 5.

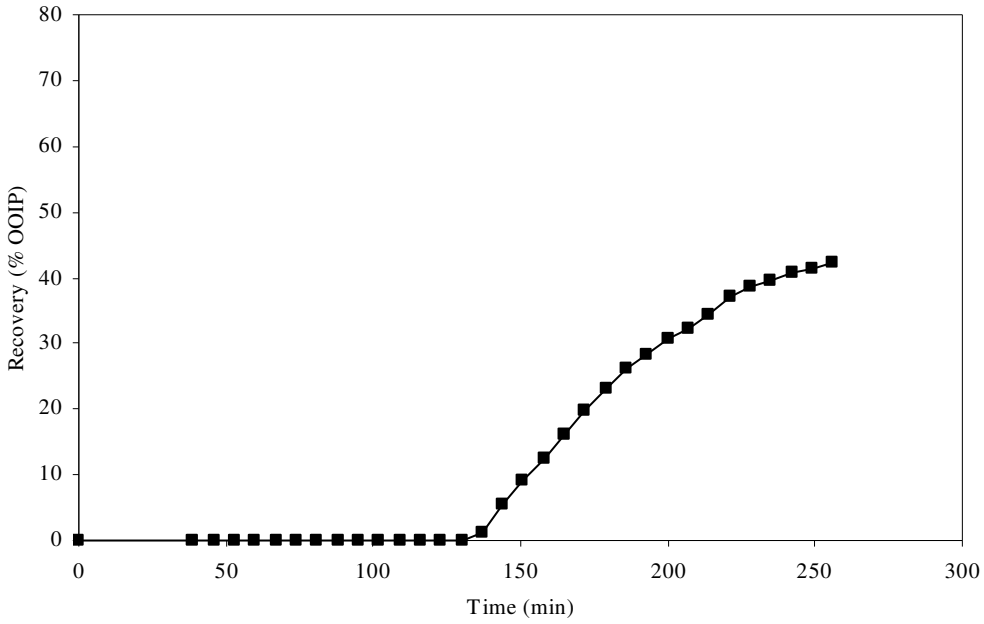

Fig. 4.49– Oil recovery versus time for Run 5.

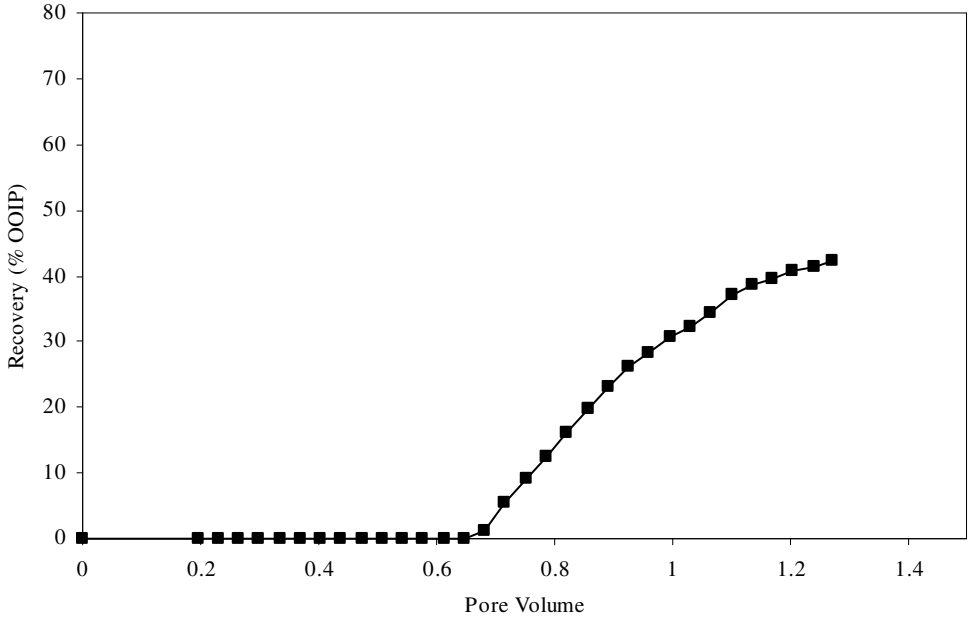

Fig. 4.50– Oil recovery versus pore volume for Run 5.

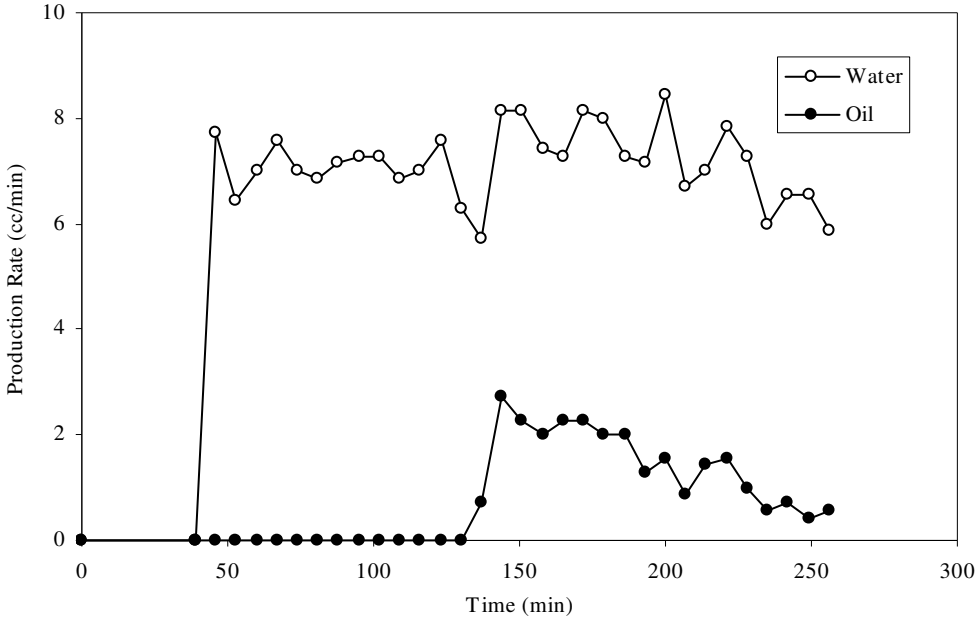

Fig. 4.51– Oil and water rates versus time for Run 5.

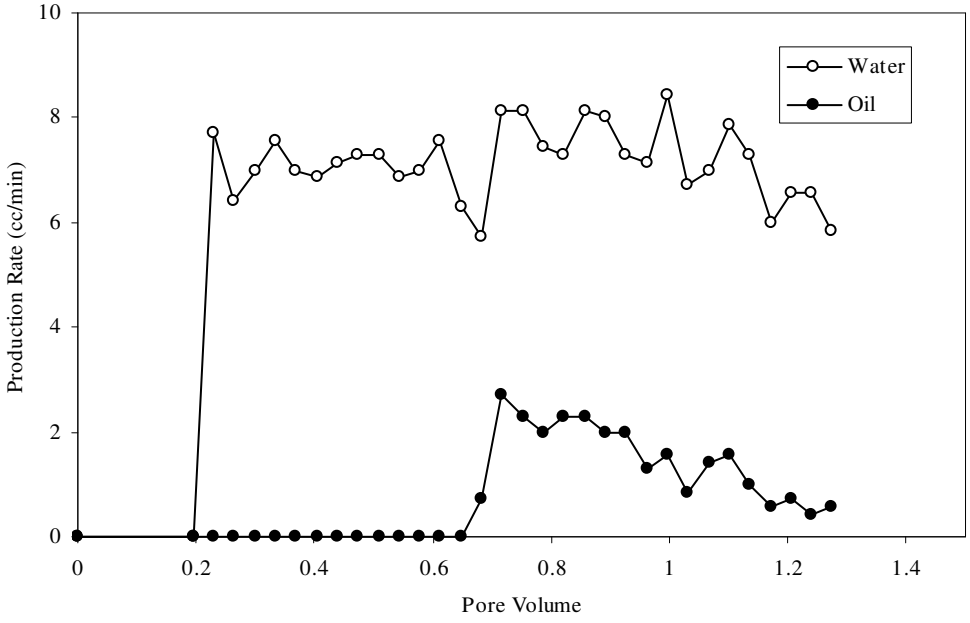

Fig. 4.52– Oil and water rates versus pore volume for Run 5.

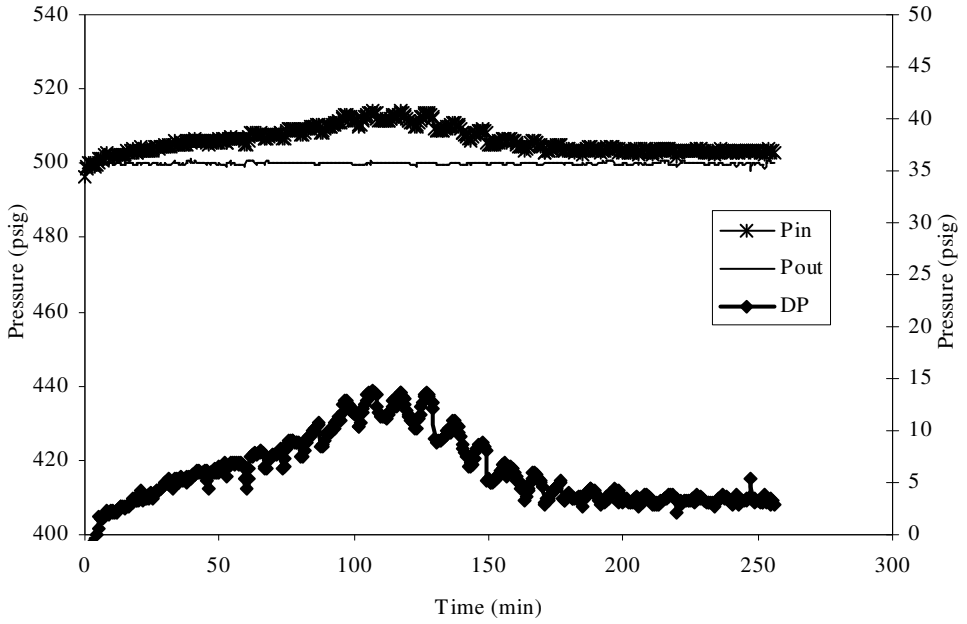

Fig. 4.53– Injection, production and differential pressure for Run 5.

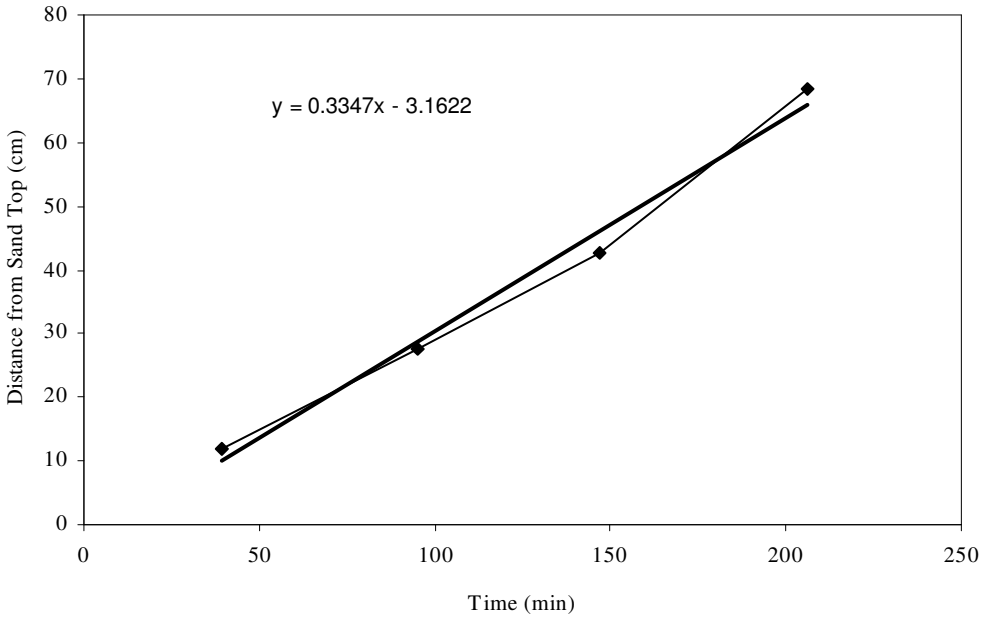

Fig. 4.54– Steam front velocity for Run 5.

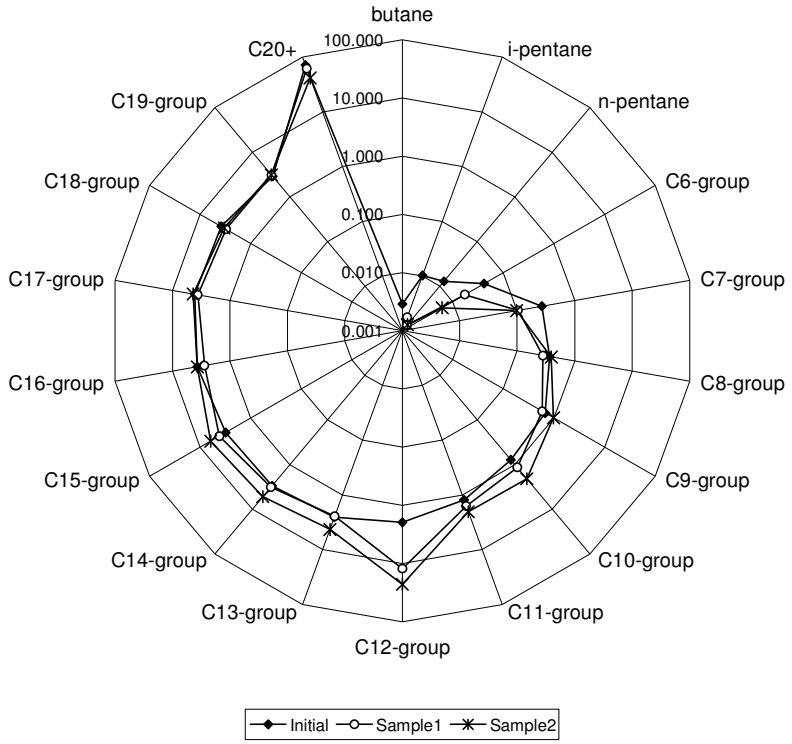

Fig. 4.55– GC analysis for Run 5.

Table 4.6– Oil properties for Run 5.

	Density g/cc	°API	Viscosity, cp			V, ppm	Ni, ppm	H/C ratio
Original	0.9826	12.37	7832	3071	1434	257.0	86.6	1.62
Sample 1	0.9768	13.21	988	519	305	208.8	67.3	1.61
Sample 2	0.9644	15.08	271	163	104	171.6	54.4	1.61

4.7 Run 6 (5 wt% Pre-mixed Tetralin-Catalyst)

This run consists of a pre-mixed 5 wt% tetralin-catalyst solution. The concentration of catalyst ($Fe(acac)_3$) in the tetralin is 750 ppm. The solution is added and mixed with the sand, water, oil mixture before tamping.

The average steam injection temperature for this run was 269°C, as deduced from the temperature profile (**Fig. 4.56**). Steam injection temperature oscillation behavior was observed in the later part of the run. The temperature throughout the injection cell reached saturation temperature at just after 180 minutes as shown in **Fig. 4.57**.

Fig. 4.58 and **Fig. 4.59** show the cumulative produced volumes of oil and water with respect to time and pore volume. The total produced oil was 210 cm^3 at the end of the run (256 min). This resulted in a 49% oil recovery of the OOIP. The complete recovery profiles versus time and pore volume are shown in **Fig. 4.60** and **Fig. 4.61**. The peak production rates were established as 3.0 cm^3/min for oil and 7.86 cm^3/min for water using **Fig. 4.62** and **Fig. 4.63**.

The maximum and average differential pressures for this run were 16.5 psig and 5.3 psig respectively. The pressure profile is shown in **Fig. 4.64**.

The steam front velocity in shown in **Fig. 4.65**. The average steam front velocity was computed as 0.41 cm^3/min (24.6 cm/hour). The steam front velocity for this run was almost constant during the entire run.

Fig. 4.66 shows the GC analysis for the initial and produced oil samples. The produced oil showed slightly greater percentages of C_9 through C_{17} fractions, and lower quantities of the heavier components C_{18} to C_{20+}.

Table 4.7 shows the oil properties of the initial and produced oil samples. The oil gravity tends to increased with time and showed an increase of 2.71° API. Both density and viscosity showed a significant reduction. The average heavy metal content declined

by as much as 35% for vanadium and 37% for nickel. The hydrogen to carbon ratio increased for both samples.

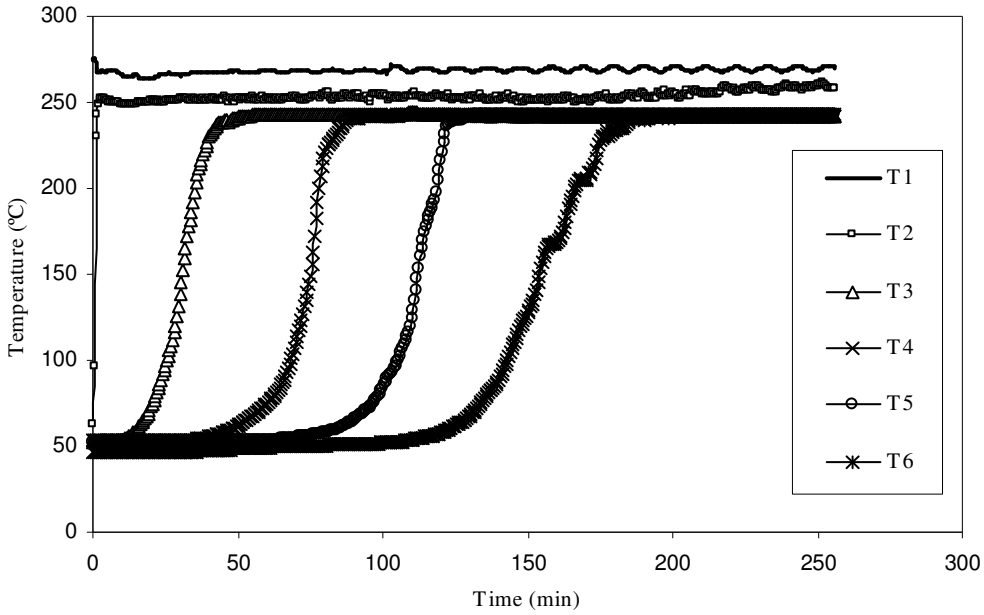

Fig. 4.56– Temperature profile for Run 6.

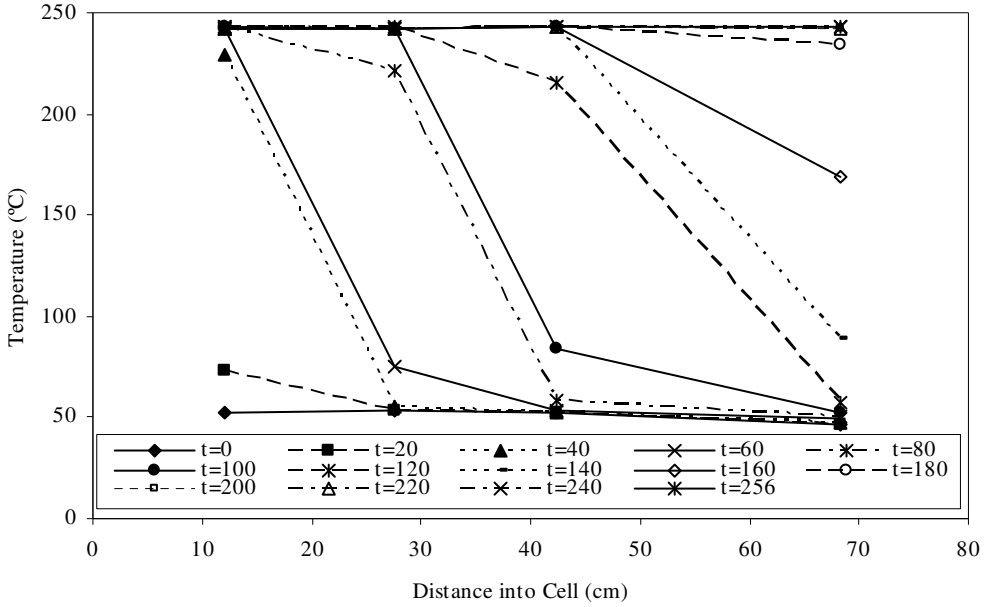

Fig. 4.57– Temperature profiles at 20 min intervals for Run 6.

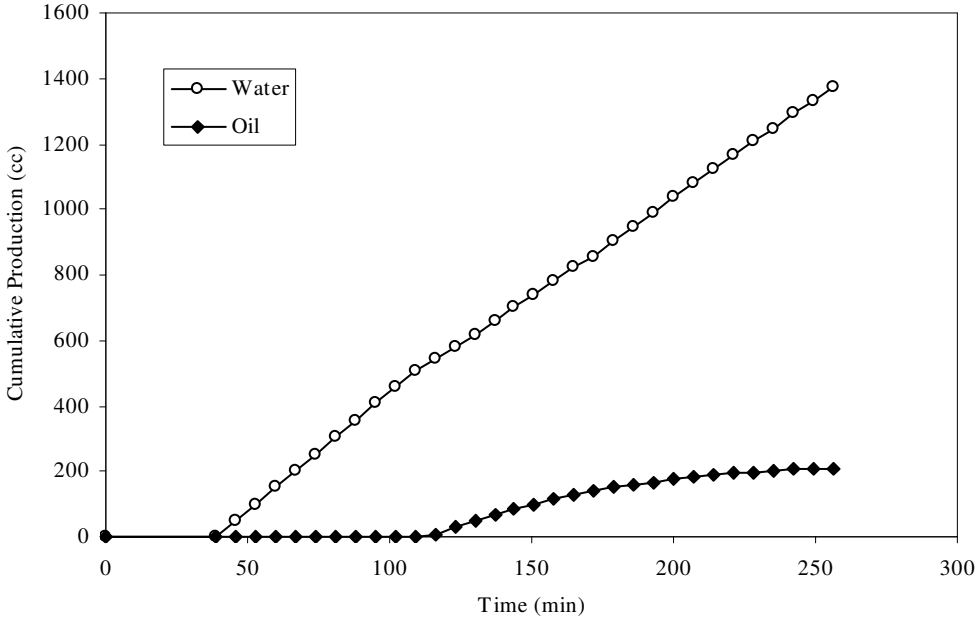

Fig. 4.58– Cumulative oil and water production versus time for Run 6.

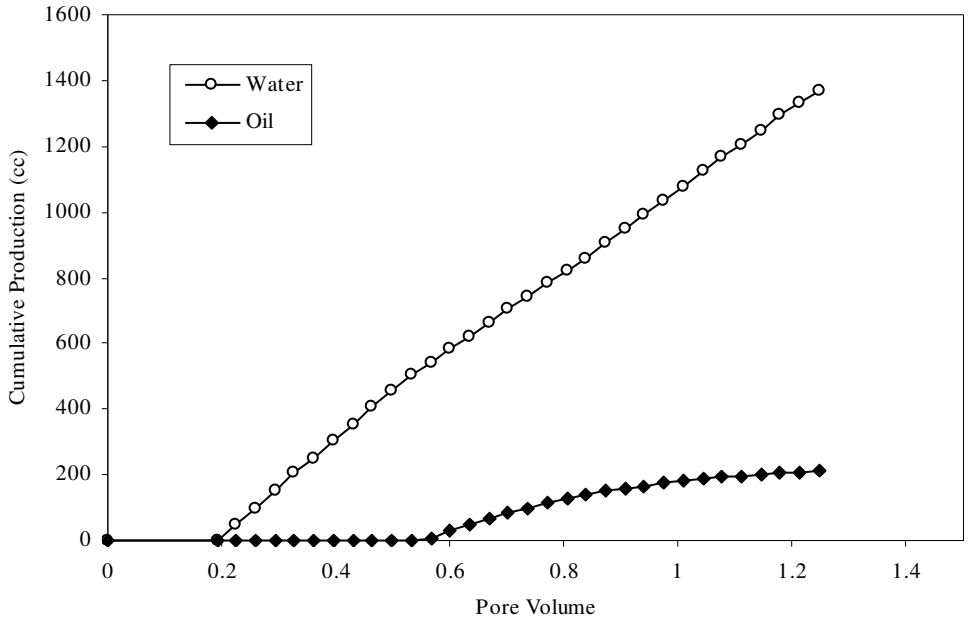

Fig. 4.59– Cumulative oil and water production versus pore volume for Run 6.

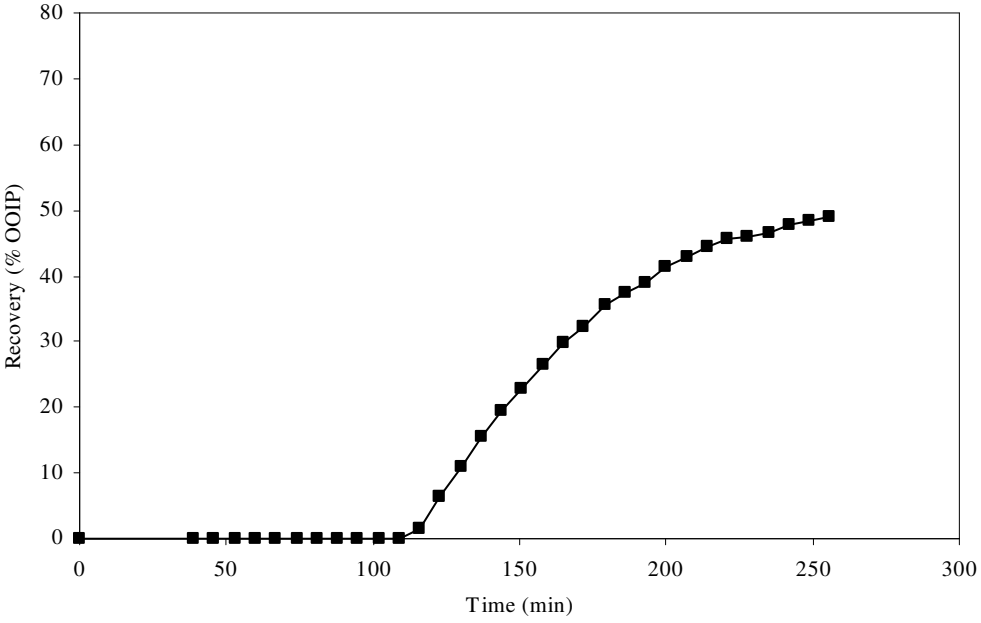

Fig. 4.60– Oil recovery versus time for Run 6.

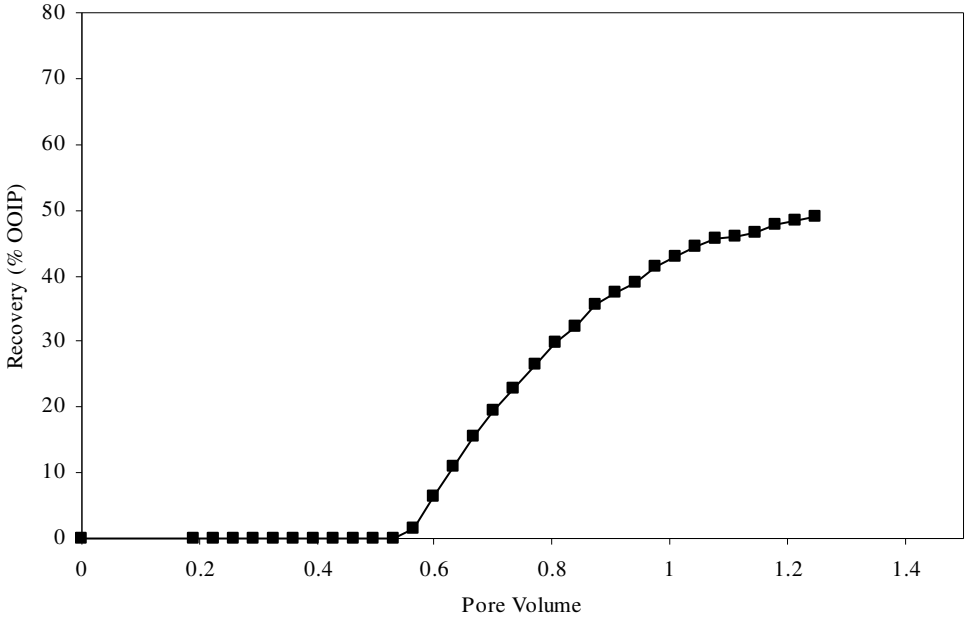

Fig. 4.61– Oil recovery versus pore volume for Run 6.

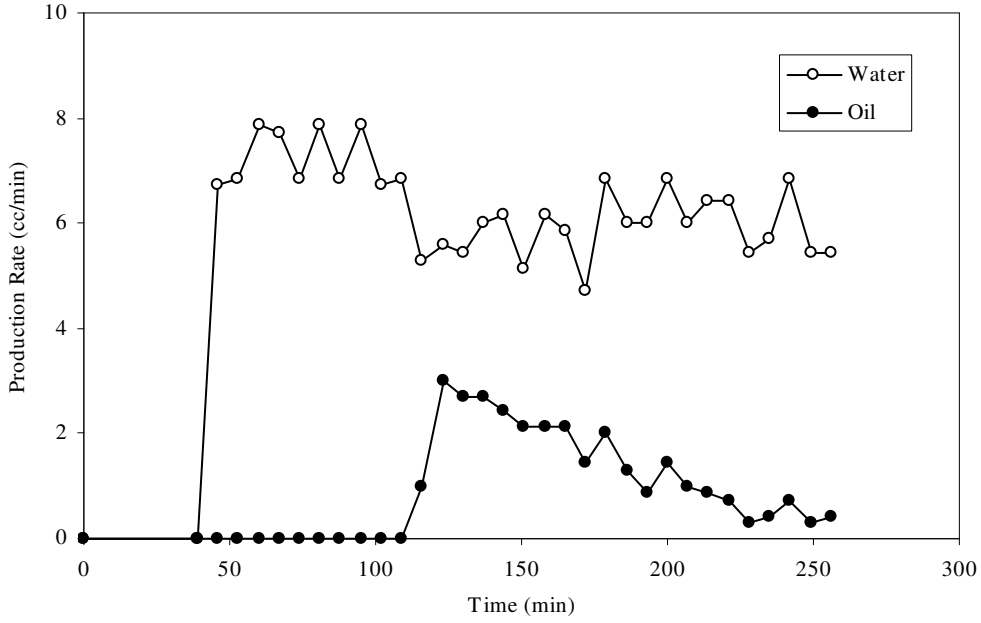

Fig. 4.62– Oil and water rates versus time for Run 6.

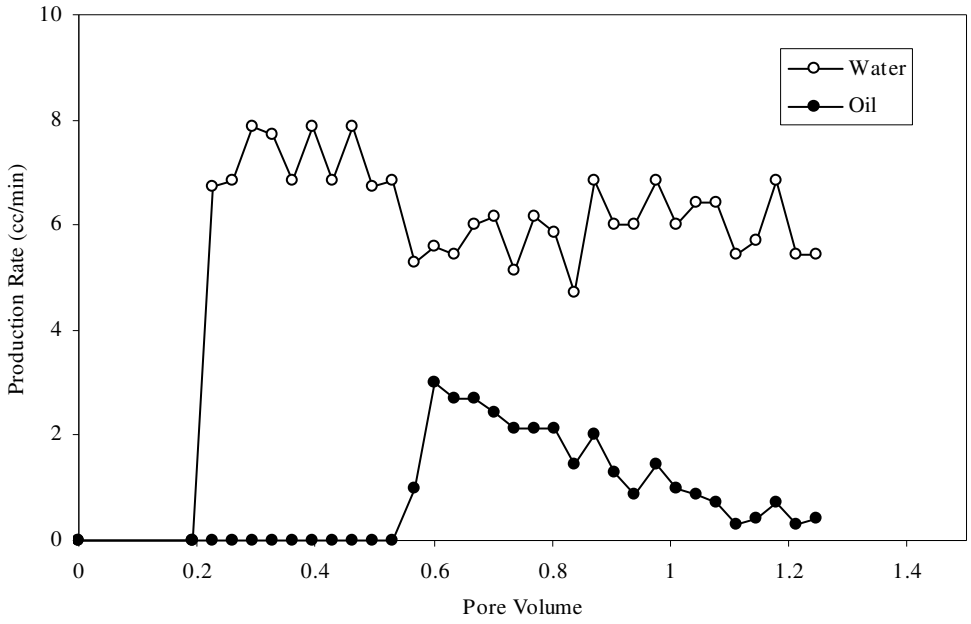

Fig. 4.63- Oil and water rates versus pore volume for Run 6.

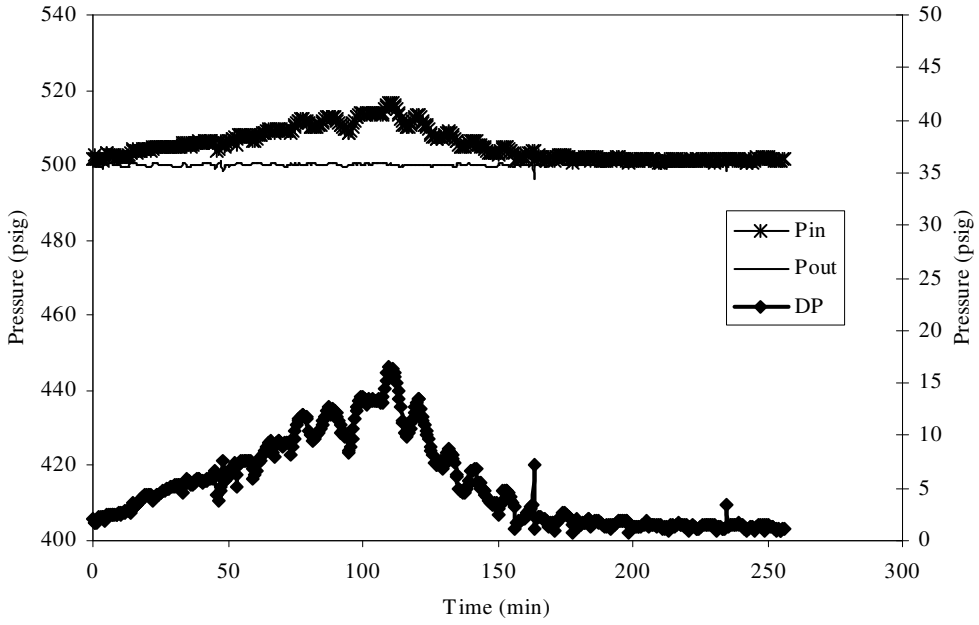

Fig. 4.64– Injection, production and differential pressure for Run 6.

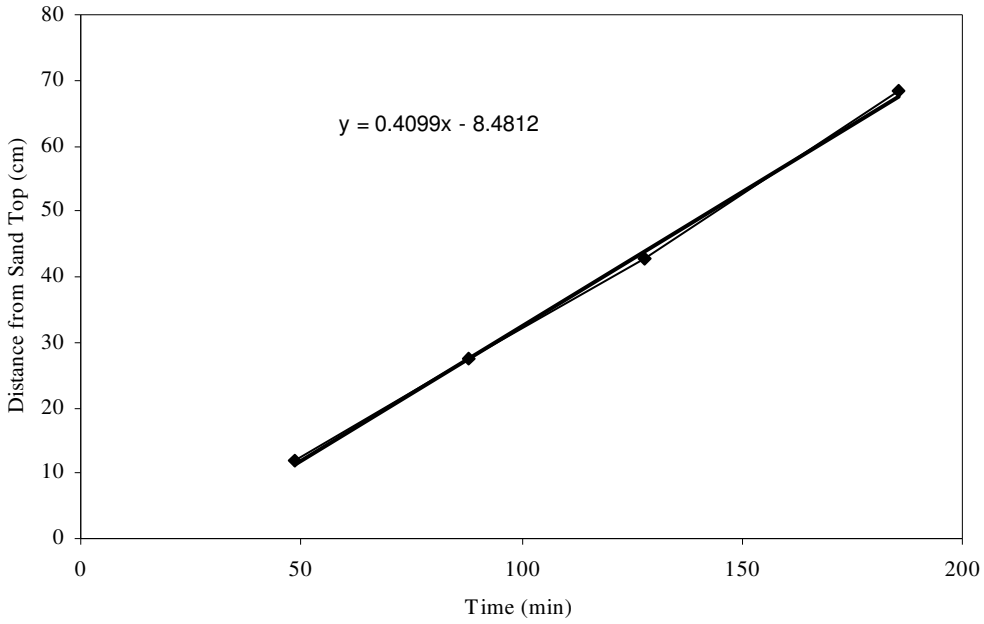

Fig. 4.65– Steam front velocity for Run 6.

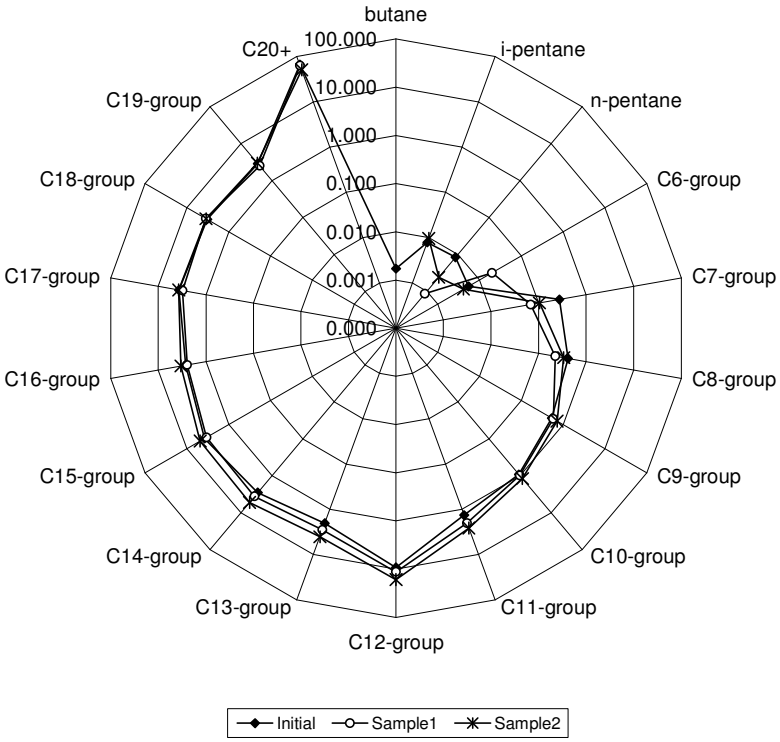

Fig. 4.66– GC analysis for Run 6.

Table 4.7– Oil properties for Run 6.

	Density g/cc	°API	Viscosity, cp			V, ppm	Ni, ppm	H/C ratio
Initial	0.9821	12.43	2869	1303	694	244.1	82.3	1.56
Sample 1	0.9734	13.73	651	362	226	173.3	56.3	1.68
Sample 2	0.9619	15.46	172	102	70	162.0	53.3	1.67

4.8 Comparison and Discussion of Results

All the runs will be compared with respect to time and pore volume (PV) of steam injected. For comparative purposes all runs are assumed to have ended at 256 minutes, or 1.21 pore volumes.

Water production rates for all the runs are plotted against time and pore volume in **Figs. 4.67** and **4.68**. On average the water production starts 37 minutes (0.19 PV) into the runs and ranges between 31 to 39 minutes (0.16-0.2 PV). The earliest start of water production was for Run 4 (15 wt% Tetralin injection) after just 31 minutes (0.16 PV). The pure steam run (Run 1) came in second at 36 minutes (0.18 PV). If we exclude Run 4 the difference in the start of water production is marginal (3 minutes or 0.02 PV), this suggests that there is no acceleration effect to the addition of 5 wt% tetralin or tetralin-catalyst on water production. At higher tetralin injection volumes (Run 4 with 15 wt% tetralin) there was a small acceleration in water production by about 5 minutes or 0.04 pore volumes.

When plotted against time the cumulative water production was observed to be almost identical for all the runs except Run 1 (pure steam) that showed a slightly larger production, as shown in **Fig. 4.69**. On the other hand when the cumulative water productions were plotted against pore volume (**Fig. 4.70**), the two premixed runs showed

slightly greater water production than runs 2, 4, and 5. A summary of start of production and final produced water is shown in **Table 4.8**.

Oil production rates for all the runs are shown in **Fig. 4.71** and **Fig. 4.72**, plotted against time and pore volume respectively. Unlike the water production the start of oil production varies considerably between the runs and is shown numerically in **Table 4.9**. When compared to Run 1, all the runs demonstrated acceleration in oil production. The base run started oil production after 136 minutes (0.68 PV). The rest of the runs production started between 72 and 128 minutes (0.36 to 0.64 PV). As expected the quickest to produce was Run 4 (15 wt% tetralin), after only 72 minutes (0.36 PV), this is an acceleration in time of 47% to that of the pure steam run. On average for all of the runs, the acceleration to that of pure steam was 18% and 11% if we exclude Run 4. Both of the 5 wt% tetralin runs had an acceleration of 10%, but runs with catalyst (runs 5 and 6) resulted in 6% to 19% acceleration in time. The premixed tetralin-catalyst run showed the more dominant acceleration. More detail can be seen in **Table 4.10**.

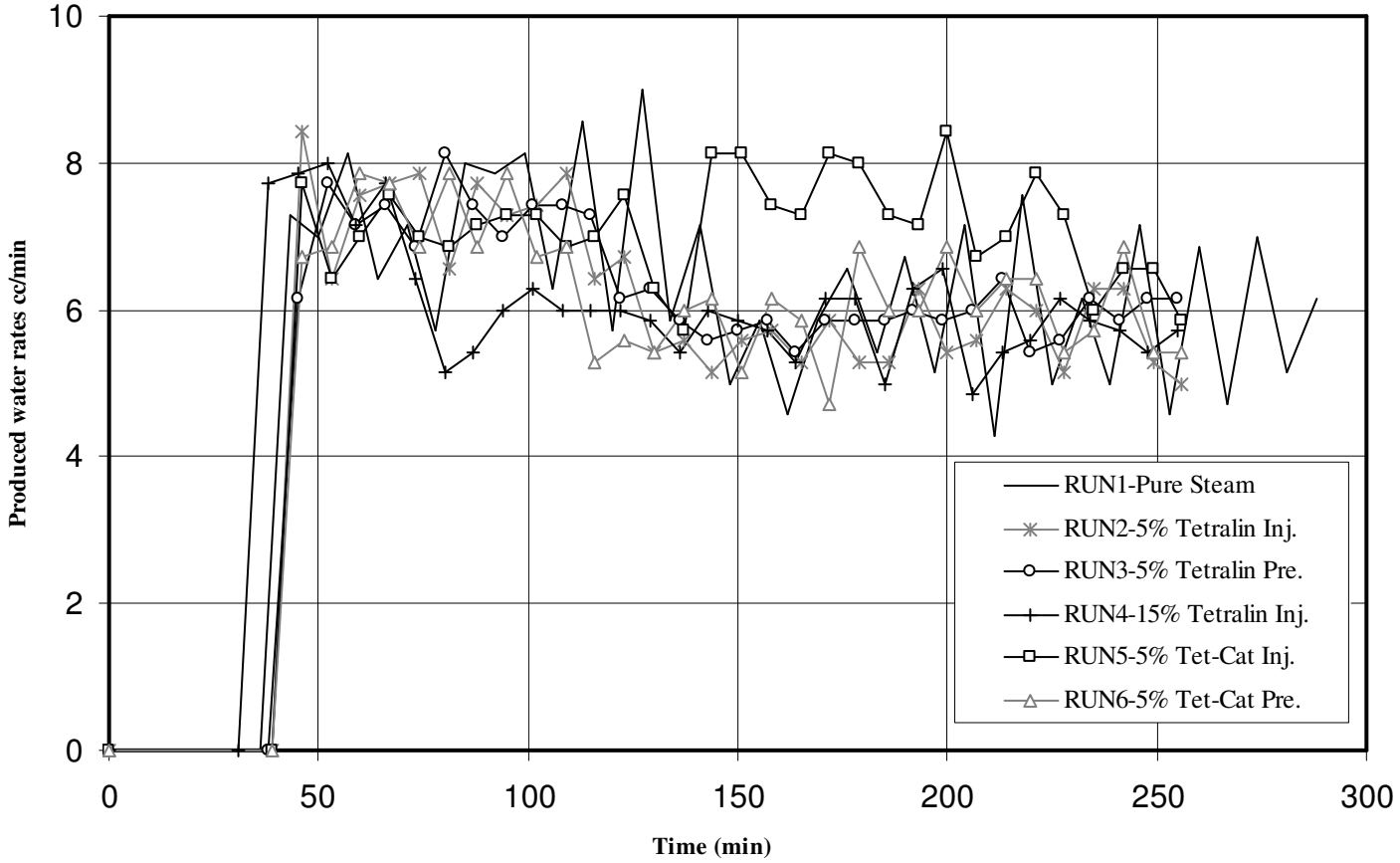

Fig. 4.67- Water rates versus time for all runs.

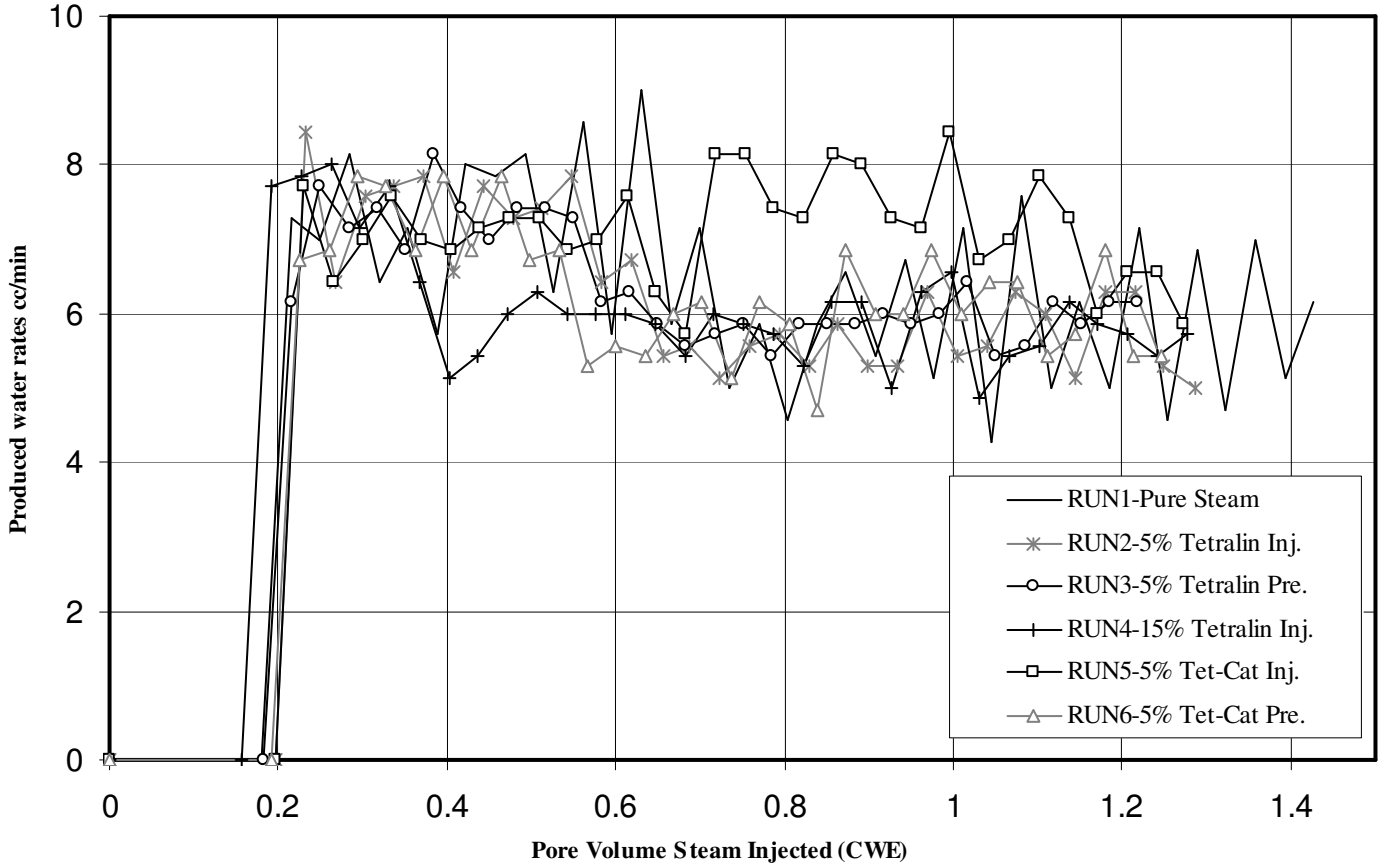

Fig. 4.68- Water rates versus pore volume injected for all runs.

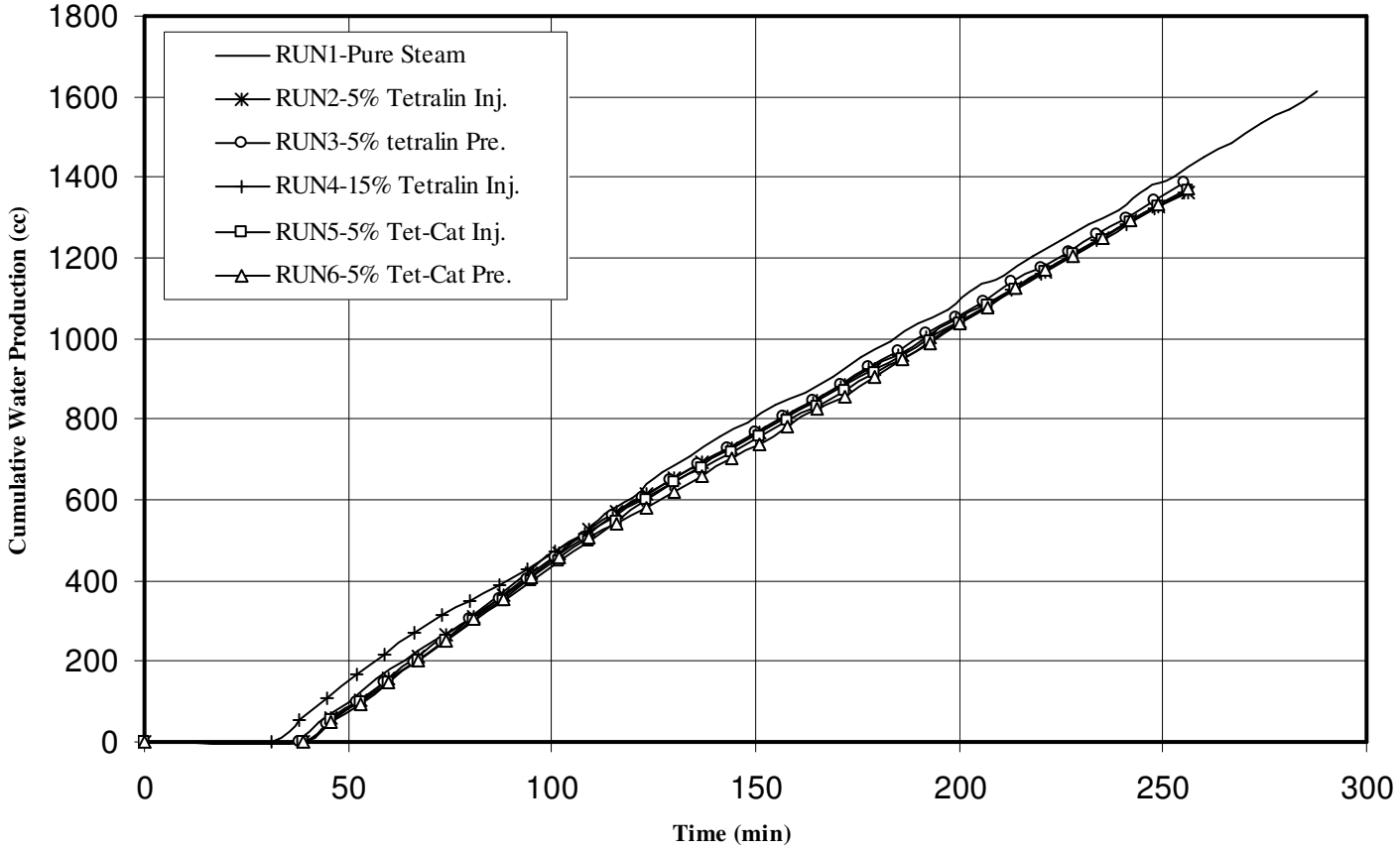

Fig. 4.69- Cumulative water production versus time for all runs.

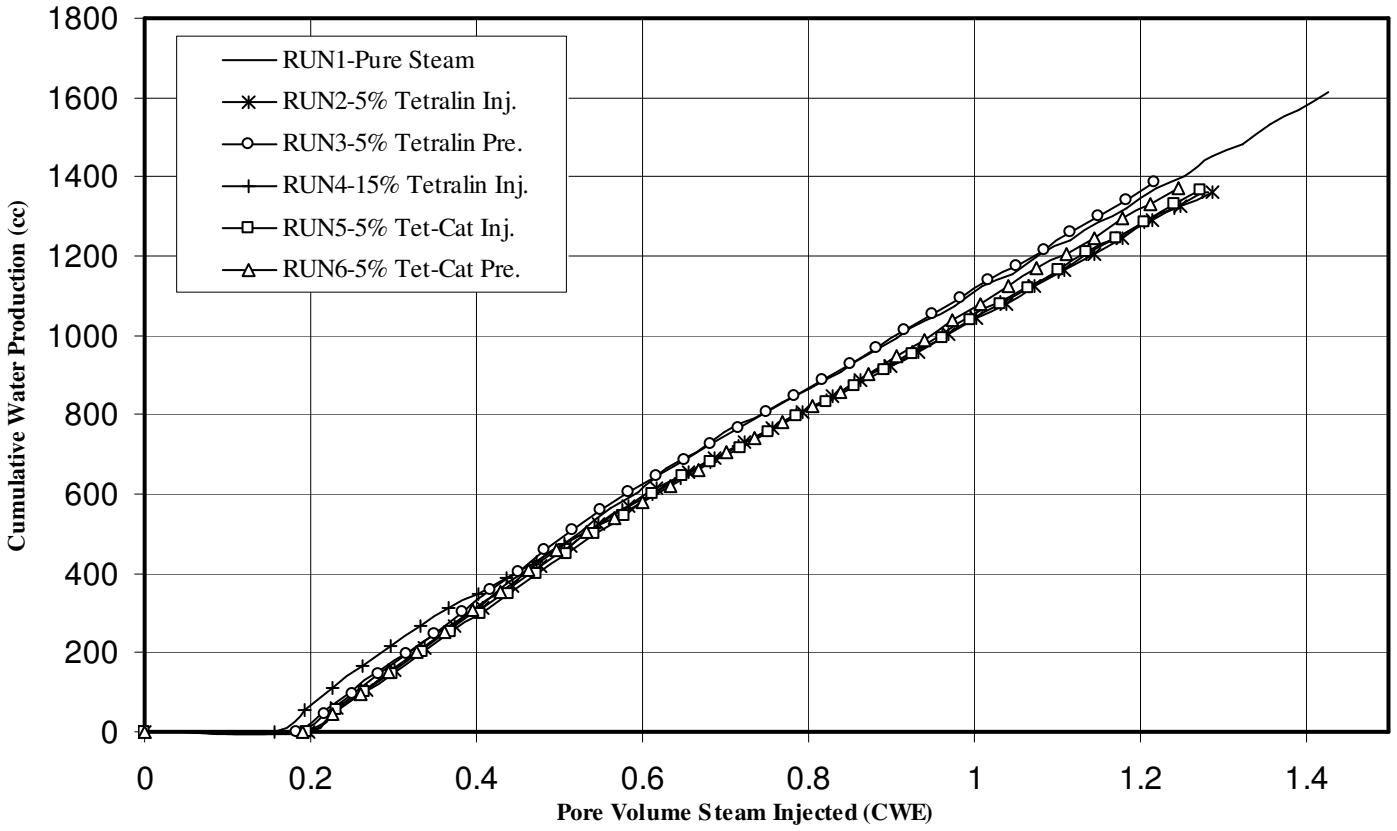

Fig. 4.70- Cumulative water production versus pore volume injected for all runs.

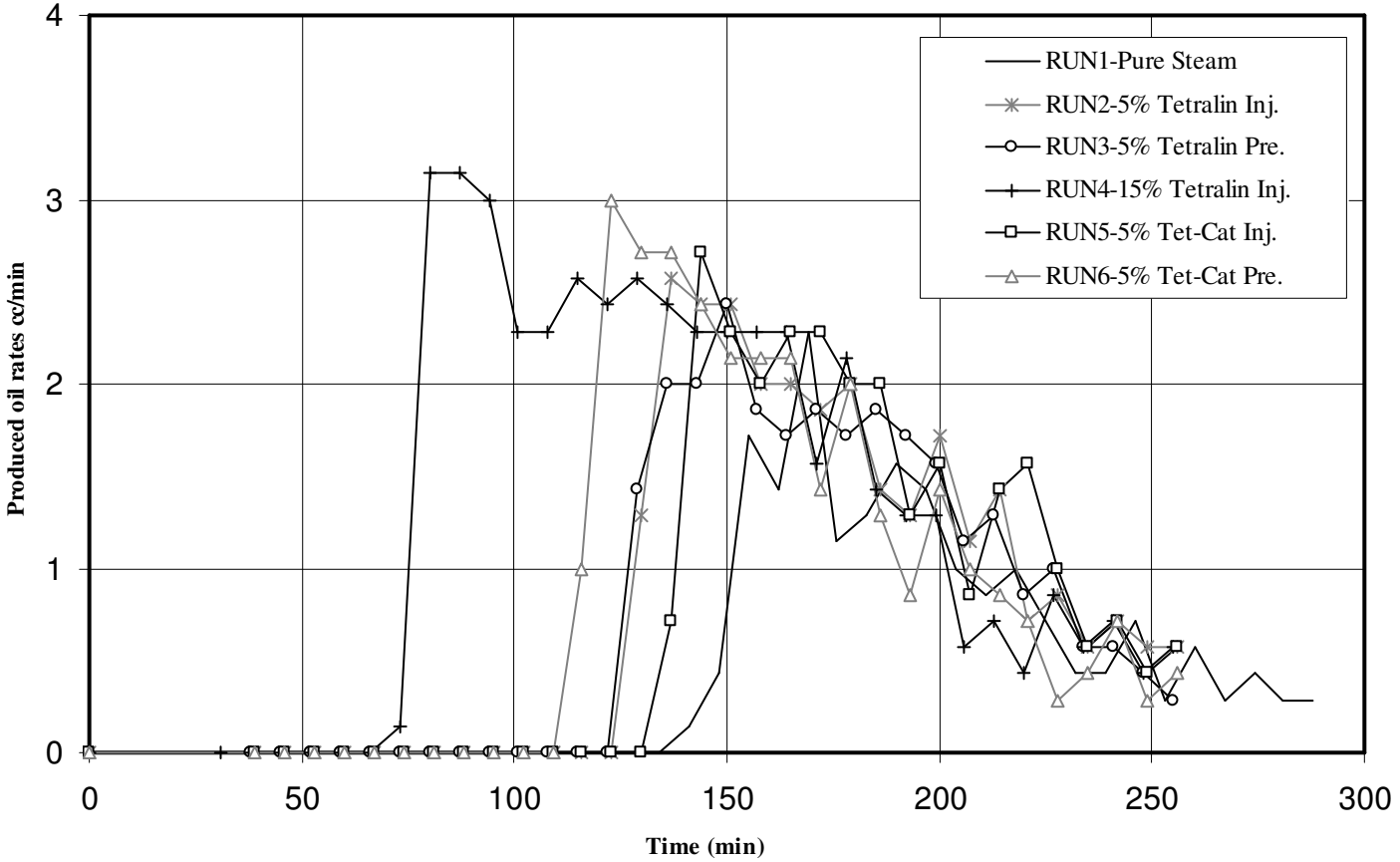

Fig. 4.71- Oil rates versus time for all runs.

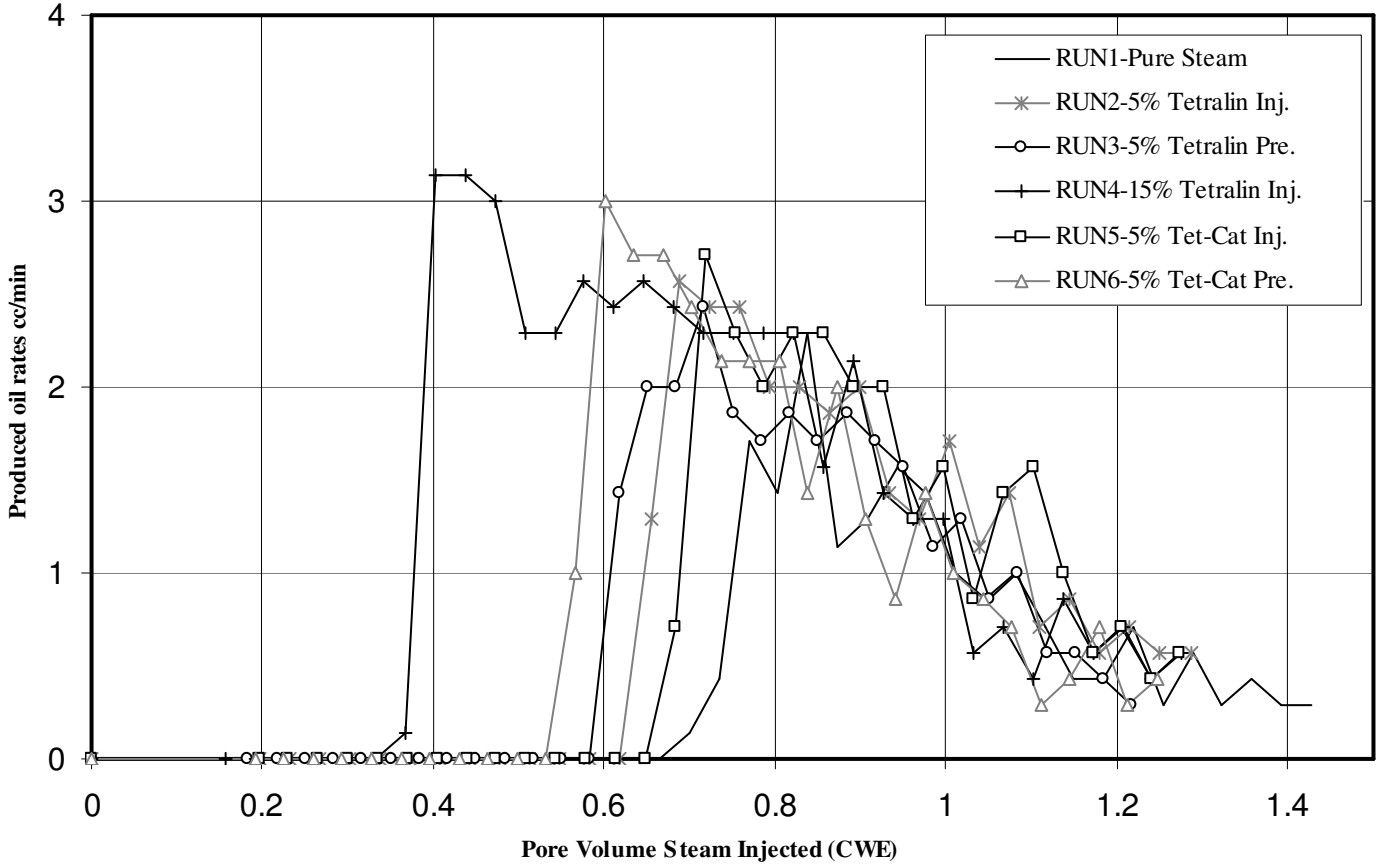

Fig. 4.72- Oil rates versus pore volume injected for all runs.

Table 4.8- Start of water production and total volume.

Run	Start of production		Final production volume (cc)		Description
	Time (min)	PV	at t=256 min	at PV=1.21	
1	36.0	0.18	1420.0	1370.0	Base
2	39.0	0.20	1363.0	1291.0	5% Tetralin Injection
3	38.0	0.18	1386.0	1386.0	5% Tetralin Pre-mixed
4	31.0	0.16	1363.0	1285.0	15% Tetralin Injection
5	39.0	0.20	1367.0	1287.0	5% Tetralin-Catalyst Injection
6	39.0	0.19	1371.0	1333.0	5% Tetralin-Catalyst Pre-mixed

Table 4.9- Start of oil production and final volume.

Run	Start of production		Final production volume (cc)		Description
	Time (min)	PV	at t=256 min	at PV=1.21	
1	136.0	0.68	131.0	116.0	Base
2	123.0	0.62	193.0	185.0	5% Tetralin Injection
3	122.0	0.58	184.0	184.0	5% Tetralin Pre-mixed
4	72.0	0.36	320.0	313.0	15% Tetralin Injection
5	128.0	0.64	184.0	177.0	5% Tetralin-Catalyst Injection
6	110.0	0.54	210.0	207.0	5% Tetralin-Catalyst Pre-mixed

Table 4.10- Oil production acceleration.

Run	Start of production		Production Acceleration (%)		Description
	Time (min)	PV	at t=256 min	at PV=1.21	
1	136	0.68	0	0	Base
2	123	0.62	10	9	5% Tetralin Injection
3	122	0.58	10	15	5% Tetralin Pre-mixed
4	72	0.36	47	47	15% Tetralin Injection
5	128	0.64	6	6	5% Tetralin-Catalyst Injection
6	110	0.54	19	21	5% Tetralin-Catalyst Pre-mixed

The cumulative volume of produced oil is presented in **Fig. 4.73** and **Fig. 4.74**, plotted against time and pore volume respectively. The least amount of oil was produced from the pure steam injection (131 cm^3) and the largest production was 320 cm^3 for run 4 (15 wt% tetralin injection). On average the runs produced 20% more than that of pure steam (**Fig. 4.75** and **Fig. 4.76**). If we exclude run 4 the average recovery is about 17%

more than the pure steam. Unlike runs 2 and 3 (5 wt% tetralin), runs 5 and 6 (5 wt% tetralin-catalyst) yielded different recoveries. Run 5 (injected tetralin-catalyst) had a recovery of 42% nearly equal to that of the two tetralin runs which produced 44% recovery. Run 6 (5 wt% tetralin-catalyst premix) resulted in a 49% recovery, 5% higher than runs 2 and 3, and 20% higher than the pure steam run. Run 4 produced the highest recovery (67% OOIP), while pure steam yielded only 29% oil recovery. **Table 4.11** listed the recoveries of the runs with respect to time and pore volume.

The difference in the recoveries of the two tetralin-catalyst runs emphasizes the importance of catalyst dispersion for better oil contact. The injected catalyst in run 5 may have only come in contact with the crude at the top portion of the injection cell, whereas in the premixed run, the catalyst came into contact with more of the oil.

The differential pressure as a function of time for all the runs is presented in **Fig. 4.77**. The differential pressure is the difference between the injection and the production pressure (production pressure was held constant at 500 psig). The injection pressure starts increasing immediately as the steam is injected into the cell. The average maximum differential pressure for the runs was 16.5 psig. The average maximum pressure for all the runs except run 1 and 4 is 14.9 psig. The overall trend is the more tetralin was added the higher the injections pressure, thus greater differential pressure.

The steam front location for each of the runs is plotted in **Fig. 4.78**. In this plot the slope of the curve indicates the steam front velocity. A straight line regression was used to determine the average velocity of the steam front for each run. The run with the premixed catalyst (run 6) was faster than the rest although it was not the first to produce.

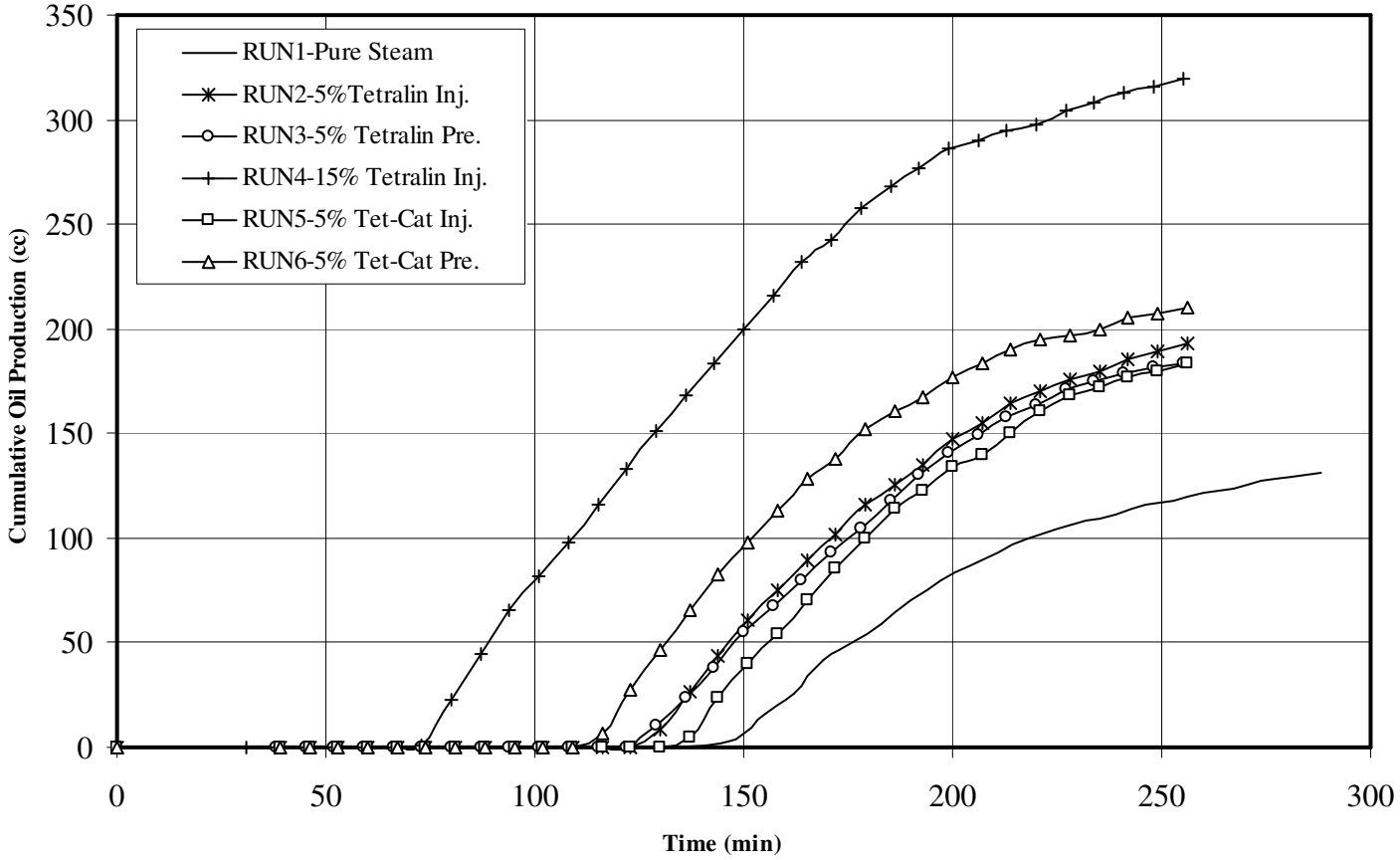

Fig. 4.73- Cumulative oil production versus time for all runs.

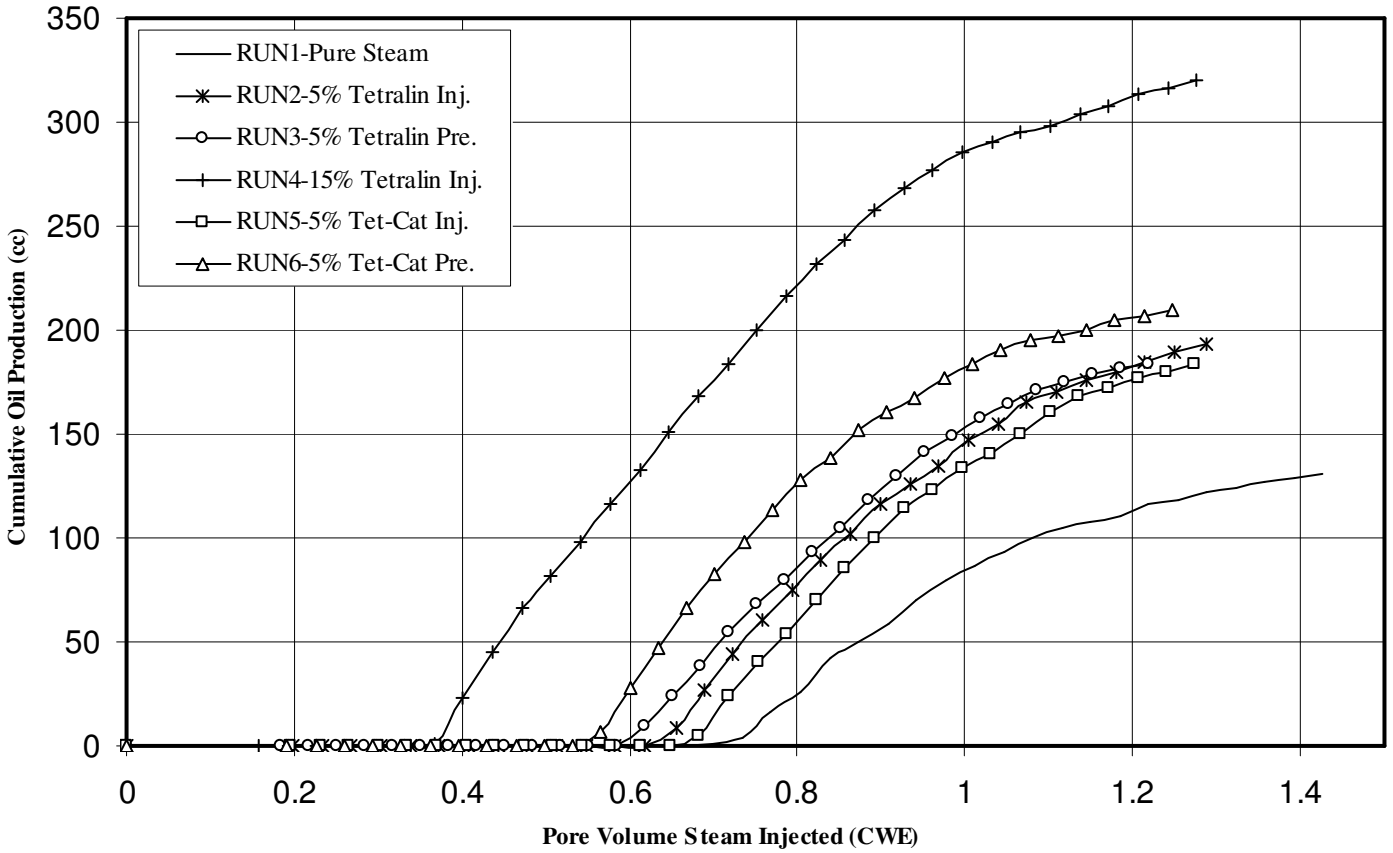

Fig. 4.74- Cumulative oil production versus pore volume injected for all runs.

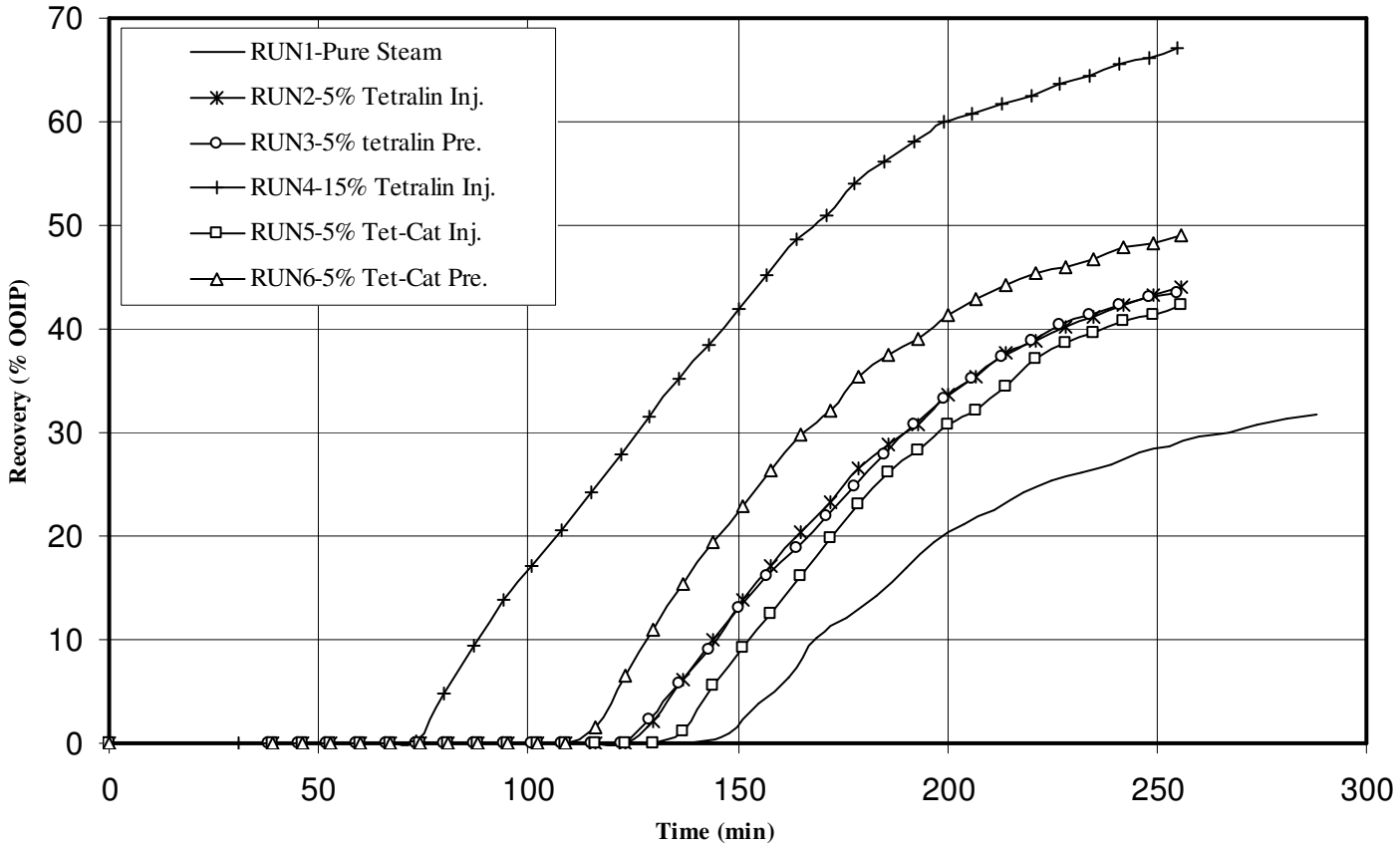

Fig. 4.75- Oil recovery versus time for all runs.

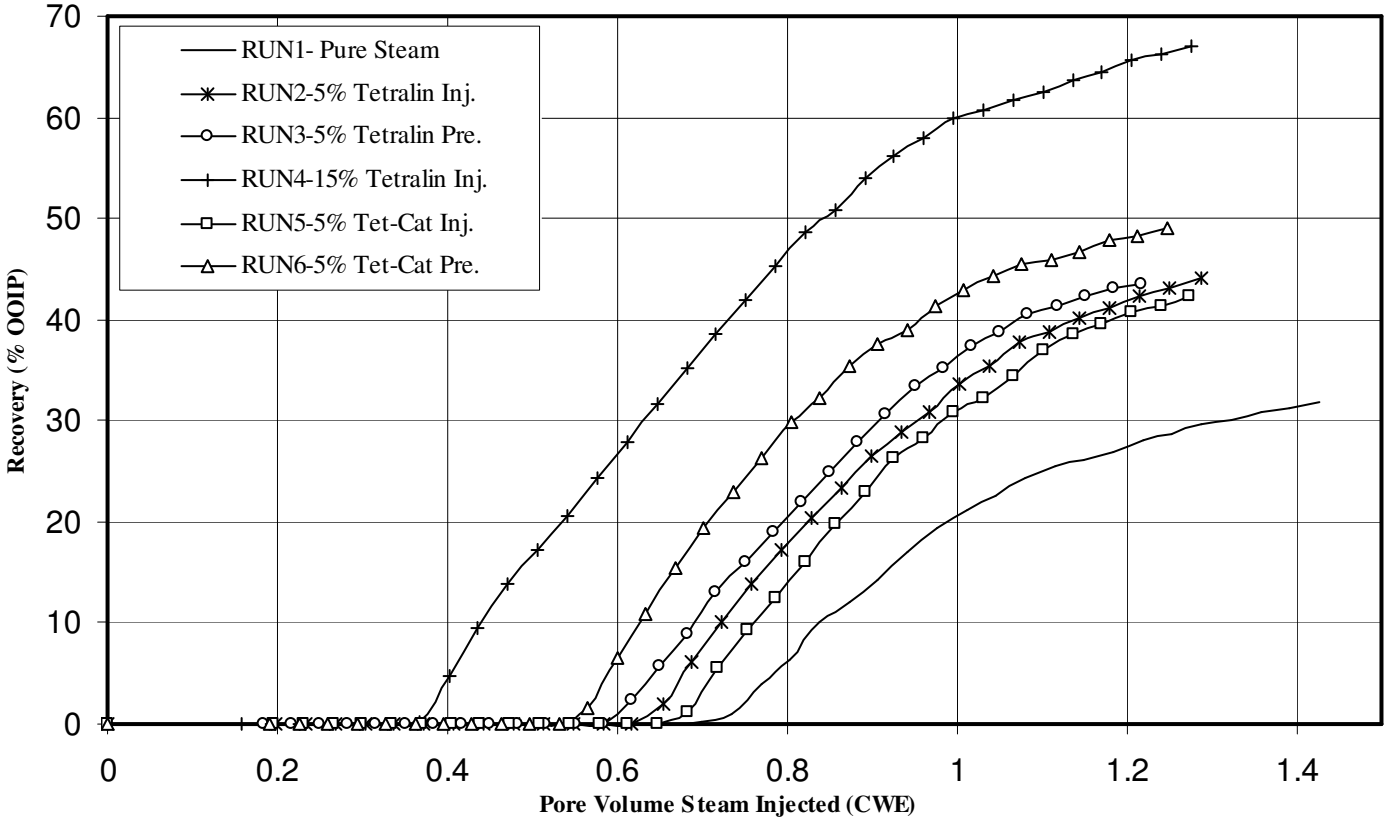

FIG. 4.76- Oil recovery versus pore volume injected for all runs.

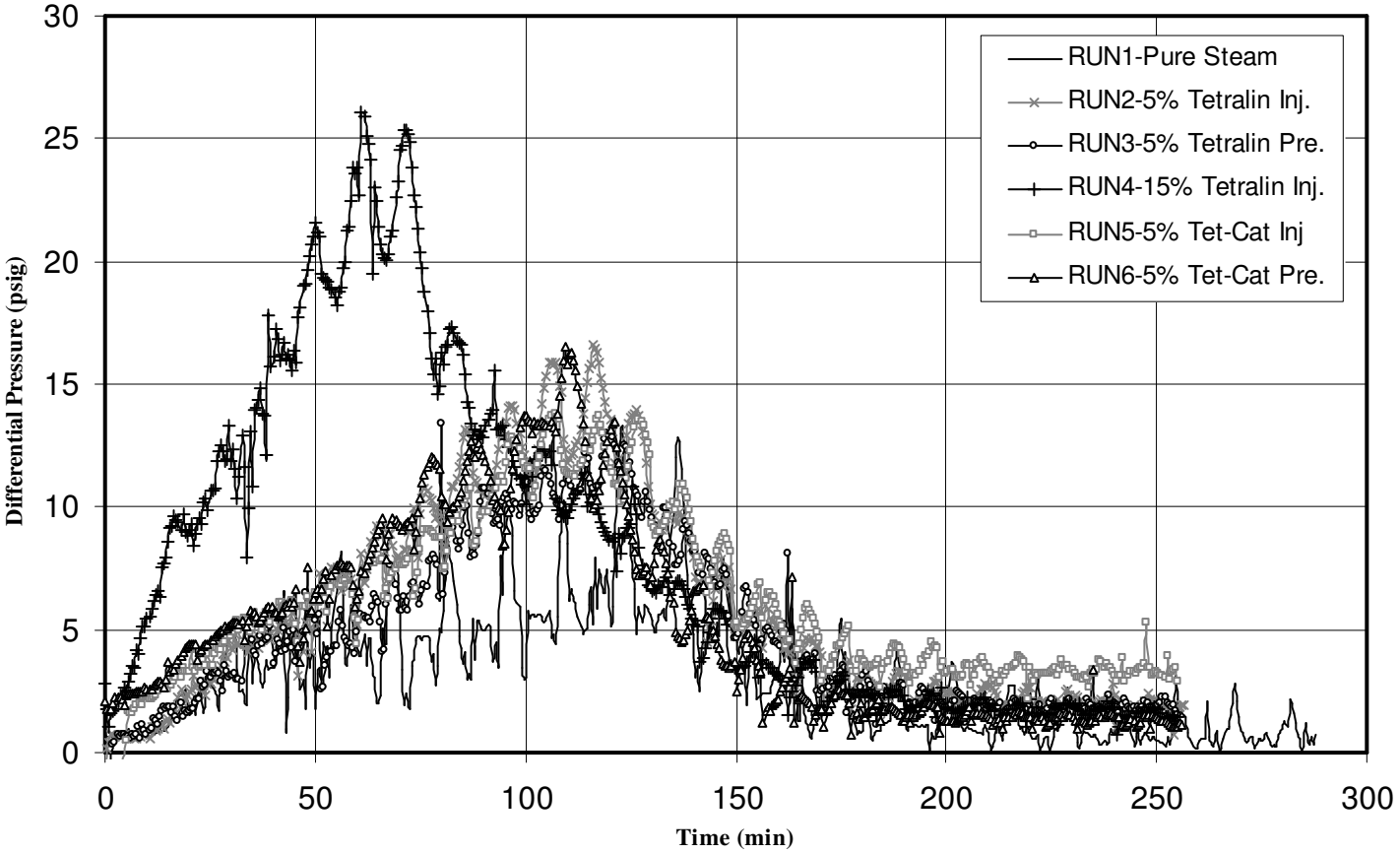

Fig. 4.77- Differential pressure versus time for all runs.

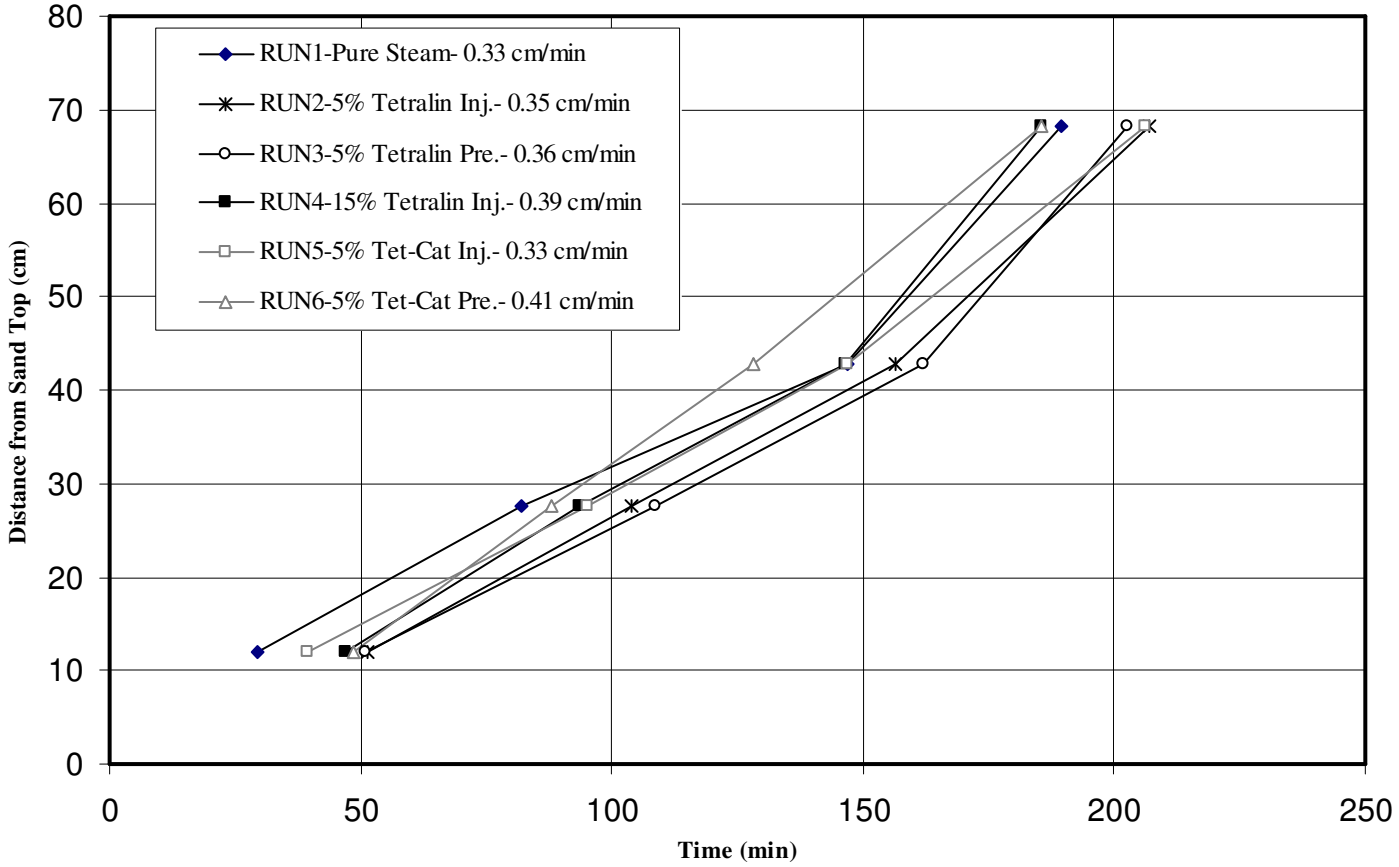

Fig. 4.78- Steam front location versus time for all the runs.

Table 4.11- Oil recovery.

Run	Recovery (%)		Description
	at t=256 min	at PV=1.21	
1	29.0	28.1	Base
2	44.0	42.3	5% Tetralin Injection
3	44.0	43.5	5% Tetralin Pre-mixed
4	67.0	65.6	15% Tetralin Injection
5	42.0	40.7	5% Tetralin-Catalyst Injection
6	49.0	48.3	5% Tetralin-Catalyst Pre-mixed

Oil density expressed in API gravity, is plotted in **Fig. 4.79**. For each run three API gravity measurements were conducted, one for the initial oil in the sand mixture and the other two for the production samples. As expected the oil gravity increased for each of the runs with time. The pure steam run (run 1) had the highest API gravity for the second sample. Near the end of all the runs the oil produced was observed to be very light (high API), and since run 1 was left producing for a longer time it produced relatively more of this lighter oil. The tetralin-catalyst premix run (run 6) exhibited the second highest oil gravity, keeping in mind it also had the second highest recovery. Run 4 (15 wt% tetralin injection) had the lowest API gravities for its sample. The other three runs (2, 3, & 5) had very similar gravities that fell between those of run 4 and run 6.

The sample viscosities show a decreasing trend with respect to time and are significantly lower than the viscosity of the original crude oil (**Table 4.12**). Run 4 showed the lowest average viscosity for its samples at all the tested temperatures. The premixed tetralin-catalyst showed the next lowest viscosities, whereas the pure steam run showed the highest average viscosities throughout the tested temperature range for its produced oil samples.

The heavy metal content and H/C ratios for the runs are shown in **Table 4.13**. The pure steam run showed the least decrease in the heavy metal content, 17% for both vanadium and nickel. The largest decrease in heavy metal was observed in runs 4 and 6, both with more than 34% reduction. The rest of the runs had a reduction in heavy metal content of 24% to 30%.

Fig. 4.80 depicts the H/C ratios for all of the sample and initial crude. The H/C ratios ranged from 1.54 to 1.68. Run 6 (tetralin-catalyst premix) displayed the highest H/C ratio increase, while runs 1 and 4 showed some reduction in the H/C ratio to that of initial crude.

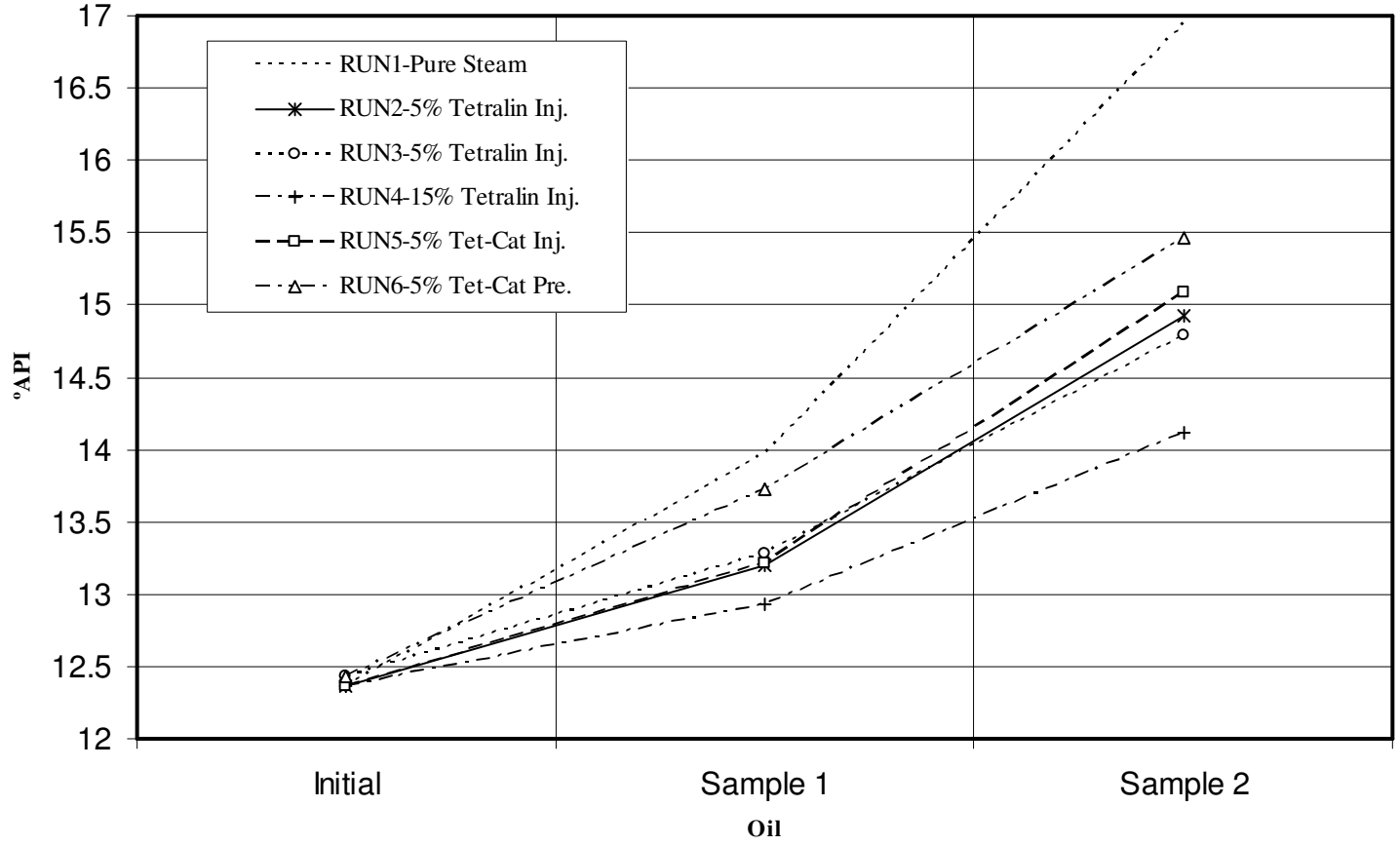

Fig. 4.79- Oil gravity comparison.

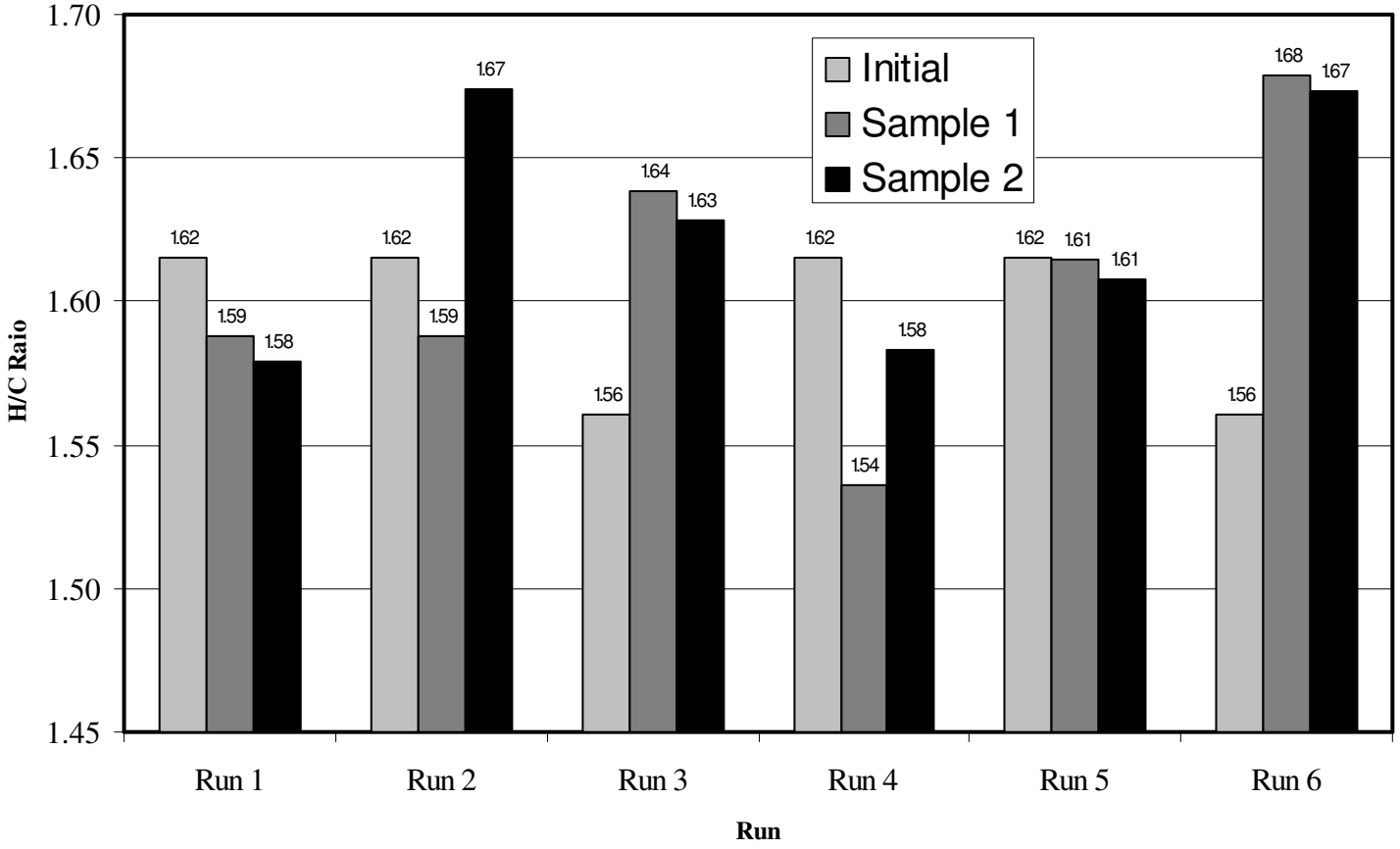

Fig. 4.80- H/C ratios for all runs.

Table 4.12- Viscosity (in cp) for initial oil and production samples.

μ @	Sample	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Remarks
30℃	Initial	7832	7832	2869	7832	7832	2869	Oil in sand mix
	Sample 1	1490	829	932	181	988	651	First half of production
	Sample 2	243	232	263	111	271	172	Second half of production
40℃	Initial	3071	3071	1303	3071	3071	1303	Oil in sand mix
	Sample 1	792	475	573	122	519	362	First half of production
	Sample 2	134	156	176	76	163	102	Second half of production
50℃	Initial	1434	1434	694	1434	1434	694	Oil in sand mix
	Sample 1	473	278	311	78	305	226	First half of production
	Sample 2	96	92	99	54	104	70	Second half of production

Table 4.13- Heavy metal content and H/C ratios.

		V, ppm	Ni, ppm	H/C ratio	Remarks
Initial	Original	257	87	1.62	
	5% Tetralin	244	82	1.56	
Run 1	Initial	257	87	1.62	Base
	Sample 1	229	78	1.59	
	Sample 2	197	67	1.58	
Run 2	Initial	257	87	1.62	5% Tetralin Injection
	Sample 1	195	64	1.59	
	Sample 2	186	69	1.67	
Run 3	Initial	244	82	1.56	5% Tetralin Premixed
	Sample 1	199	65	1.64	
	Sample 2	172	57	1.63	
Run 4	Initial	257	87	1.62	15% Tetralin Injection
	Sample 1	182	60	1.54	
	Sample 2	157	51	1.58	
Run 5	Initial	257	87	1.62	5% Tetralin-catalyst Injection
	Sample 1	209	67	1.61	
	Sample 2	172	54	1.61	
Run 6	Initial	244	82	1.56	5% Tetralin-catalyst Premixed
	Sample 1	173	56	1.68	
	Sample 2	162	53	1.67	

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

If run 4 (15 wt% tetralin) was excluded from the comparison, we can clearly see that run 6 (tetralin-catalyst premix) showed the highest recovery (49% OOIP) and oil gravity while having the largest reduction in heavy metal content and the highest H/C ratios. The tetralin-catalyst injection run (run 5) did not show the same characteristics as the premixed version. This suggests that the catalyst was not effective in run 5, which is probably due to a modest catalyst to oil contact. Tetralin alone has shown to be a viable steam additive. A 5 percent by weight injection of tetralin slug improved recovery by as much as 15% to that of pure steam.

5.2 Conclusions

Using tetralin alone as an additive with steam showed increased recovery (14%-15%). It also showed 10% acceleration in the oil production, while keeping the water production the same or slightly lower than the pure steam. These results are due to tetralin viscosity reduction ability. Tetralin runs showed no distinction whether injected or premixed.

The two tetralin-catalyst runs showed dissimilar results. The tetralin-catalyst injection run results were comparable to that of the tetralin runs. Meanwhile the tetralin-catalyst premix run (run 6) displayed improvement over the tetralin runs. These improvements over the tetralin runs include higher oil recovery (5%-6%), 9% oil

production acceleration and a 5% to 10% greater reduction in heavy metals. The API gravity and viscosities were also better than that of the pure steam and tetralin runs.

The H/C ratios were found to be inconclusive in predicting upgrading, since the largest change was observed to be only 0.12, which maybe due to the production of more of the lighter components and leaving behind the heavier component groups (C_{18}- C_{20+}).

Run 6 showed 15% more heavy metal reduction than run 1 (pure steam) and approximately 10% greater reduction than similar runs (2, 3, and 5). The over all oil analysis for run 6 show evidence of some oil upgrading.

Although, these experiments have simulated steam injection they have not fully simulated the kinetics of the catalyst. The major draw back in these experiments is that we cannot scale down the kinetics, like we do with the steam process. As we know, catalytic reactions are dictated by temperature and time. To achieve a certain level of upgrading we must either increase the temperature or lengthen the reaction time. Since we are limited to the temperatures and pressures in the field than the only way is to prolong the reaction or develop new highly active low temperature catalyst. In the laboratory we were restricted to time in these experiments due to heat losses and other dynamics of the experiments. In a field application the reaction time would be significantly longer than that in these experiments and may lead to further upgrading, assuming we achieve good catalyst dispersion throughout the formation.

5.3 Recommendations

1. Repeat experiments, but extending the time of production or delaying the production to allow sufficient time for the catalyst to work, or use a new more active catalyst.
2. Investigate catalyst migration, using different permeability cores and the use of a CT scan or an X-ray diffraction to determine migration pattern and depth.
3. Investigate and design wellbore upgrading where supported catalyst can be used in conjunction with electrical heaters to achieve required catalytic temperatures.
4. Investigate the economics of both tetralin and tetralin-catalyst use in heavy oil recovery.
5. For future similar runs consider the following additional analysis:
    a. Measurement of naphthalene content to measure upgrading.
    b. SIMDIST analysis
    c. SARA analysis

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APPENDIX A

CALCULATION OF FLUID SATURATIONS

The following is a sample calculation of the fluid saturations and pore volume inside the cell. The calculations are made for Run 1.

1. Cell dimension:

   Diameter, d = 7.376, height, h = 68

   Since the cell is cylindrical, the volume of the cell is:

   $$V_{cell} = h\pi\left(\frac{d}{2}\right)^2 = 2905.63 \text{ cm}^3$$

2. The total weight of mixture (W_{mix}):

   Weight of sand, W_{sand} = 5141g

   Weight of water, W_{water} = 226g

   Weight of oil, W_{oil} = 443g

   $W_{mix} = W_{sand} + W_{water} + W_{oil}$

   W_{mix} = 5141 + 226 + 443 = 5810g

3. The weight of mixture inside the cell, W_{mix} in cell is:

   Weight of empty cell = 4514.3 g

   Weight of cell with mixture inside = 9809g

   Weight of mixture inside the cell, $W_{mixcell}$ = 9809 – 4514.3 = 5294.7g

4. Since the mixture is homogenous, the proportions of sand, water and oil remain constant before and after packing. The amount of each component inside the cell is then calculated below:

   Weight of sand inside the cell, $W_{sandcell} = \frac{W_{mixcell}}{W_{mix}} W_{sand} = \frac{5294.7}{5810} 5141 = 4685.03g$

   Weight of water inside the cell, $W_{watercell} = \frac{W_{mixcell}}{W_{mix}} W_{water} = \frac{5294.7}{5810} 226 = 205.96g$

   Weight of oil inside the cell, $W_{oilcell} = \frac{W_{mixcell}}{W_{mix}} W_{oil} = \frac{5294.7}{5810} 443 = 403.71g$

5. The sand density, ρ=2.65g/ cm^3. Thus,

   Volume of sand inside the cell, $V_{sandcell} = \frac{W_{sandcell}}{\rho_{sand}} = \frac{4685.03}{2.65} = 1767.94cm^3$

6. The Porosity inside the cell is:

   $$\phi = \frac{V_{cell} - V_{sandcell}}{V_{cell}} = \frac{2905.63 - 1767.94}{2905.63} = 0.392$$

7. The original Jobo oil has an oil gravity of 12.5 which is equivalent 0.9784g/cm^3. Water and oil volumes inside the cell are calculated as follows:

   $$V_{watercell} = \frac{W_{watercell}}{\rho_{water}} = \frac{205.96}{1} = 205.96cm^3$$

   $$V_{oilcell} = \frac{W_{oilcell}}{\rho_{water}} = \frac{403.71}{0.9784} = 412.62cm^3$$

8. The pore volume inside the cell is:

   $$V_{porecell} = \phi \times Vcell = 1137.69cm^3$$

9. The saturations are calculated as follows:

$$S_w = \frac{V_{watercell}}{V_{porecell}} = \frac{205.96}{1137.69} = 0.181$$

$$S_o = \frac{V_{oilcell}}{V_{porecell}} = \frac{412.62}{1137.69} = 0.363$$

$S_g = 1 - S_o - S_w = 0.456$ Where S_g represents the nitrogen saturation.

10. The nitrogen volume in the cell is:

$$V_N = S_g \times V_{porecell} = 0.456 \times 1137.69 = 518.79 cm^3$$

APPENDIX B

TEMPERATURE AND PRESSURE DATA

The data in the following sets of data are:

T1 : Temperature at 17.7 cm above the sand mix face.

T2 : Temperature at 3.1 cm above the sand mix face.

T3 : Temperature at 12.0 cm into the sand mix.

T4 : Temperature at 27.5 cm into the sand mix.

T5 : Temperature at 42.8 cm into the sand mix.

T6 : Temperature at 68 cm into the sand mix.

$P_{injection}$: Steam injection pressure.

P_{out} : Production pressure.

V_w : Water injection rate.

Data for runs one to six are presented in Tables B1 to B6. Below is the list of runs and a brief description of each:

- Run 1 is the base run with no tetralin or catalyst.
- Run 2 is 5 wt% tetralin slug injected prior to steam injection.
- Run 3 is 5 wt% tetralin pre-mixed with the mixture prior to tamping.
- Run 4 is 15 wt% tetralin slug injection prior to steam injection.
- Run 5 is 5 wt% tetralin solution with 750ppm ($Fe(acac)_3$) injected prior to steam injection.
- Run 6 is 5 wt% tetralin solution with 750 ppm ($Fe(acac)_3$) premixed prior to tamping.

Table B1. Pressure and Temperature Data for Run 1.

Time min	T1 °C	T2 °C	T3 °C	T4 °C	T5 °C	T6 °C	$P_{injection}$ psig	P_{out} psig	V_w cc/min
0.00	204.55	56.36	52.44	53.45	52.54	47.69	501.04	500.33	5.64
0.55	220.57	75.86	52.44	53.51	52.56	47.73	501.15	500.53	5.62
1.05	243.73	106.55	52.50	53.55	52.56	47.79	501.55	500.92	5.62
1.55	246.35	208.35	52.58	53.59	52.62	47.91	504.55	503.90	5.64
2.05	246.96	238.94	52.60	53.62	52.62	47.89	502.78	502.12	5.66
2.55	256.76	240.68	52.56	53.57	52.67	47.93	501.53	500.81	5.59
3.05	268.01	242.60	52.50	53.55	52.67	47.91	501.11	500.28	5.59
3.55	275.07	244.21	52.71	53.49	52.56	47.89	500.78	500.01	5.61
4.05	279.92	244.75	54.80	53.49	52.56	47.87	500.44	499.72	5.64
4.55	281.67	244.86	57.64	53.47	52.52	47.82	501.29	500.64	5.64
5.05	282.27	244.83	58.30	53.44	52.41	47.80	503.16	502.34	5.64
5.55	279.49	245.00	61.09	53.44	52.54	47.78	501.99	501.05	5.67
6.05	277.36	244.83	68.33	53.46	52.54	47.78	502.09	501.41	5.58
6.55	276.35	244.43	74.31	53.46	52.54	47.76	501.72	501.03	5.58
7.05	275.22	243.96	77.75	53.45	52.50	47.76	501.49	500.90	5.61
7.55	273.58	243.43	78.57	53.42	52.48	47.70	501.34	500.74	5.64
8.05	272.51	243.16	78.01	53.38	52.48	47.70	501.06	500.39	5.64
8.55	271.56	242.85	76.92	53.34	52.41	47.64	501.50	500.87	5.64
9.05	271.09	242.90	76.21	53.34	52.41	47.68	501.93	501.22	5.67
9.55	269.74	242.78	77.29	53.38	52.46	47.73	499.57	498.83	5.61
10.05	269.54	242.49	78.49	53.34	52.40	47.69	500.89	499.92	5.59
10.55	268.96	242.86	79.15	53.35	52.44	47.73	501.59	500.80	5.61
11.05	268.87	242.92	80.46	53.39	52.46	47.75	501.14	500.05	5.62
11.55	268.15	242.81	83.62	53.39	52.48	47.71	501.47	500.71	5.62
12.05	267.95	242.86	84.10	53.39	52.44	47.71	502.57	501.77	5.64
12.55	267.32	242.95	89.98	53.42	52.49	47.75	500.23	499.42	5.66
13.05	267.79	242.75	89.78	53.39	52.45	47.71	501.55	500.68	5.60
13.55	268.58	242.88	89.10	53.38	52.43	47.70	501.56	500.24	5.58
14.05	268.11	242.89	96.73	53.44	52.47	47.76	500.26	499.39	5.59
14.55	269.15	242.67	96.73	53.40	52.41	47.72	500.80	499.93	5.64
15.05	269.61	242.83	94.96	53.38	52.43	47.72	502.26	501.25	5.62
15.55	269.20	243.14	101.43	53.43	52.46	47.76	501.88	500.64	5.63
16.05	268.75	243.33	110.57	53.47	52.48	47.77	502.69	501.24	5.65
16.55	267.86	243.69	123.39	53.47	52.31	47.77	503.78	502.02	5.63
17.05	266.64	243.97	144.73	53.48	52.36	47.78	502.55	500.61	5.57
17.55	265.93	244.17	161.98	53.52	52.38	47.76	502.83	500.56	5.58
18.05	266.00	244.47	174.96	53.50	52.37	47.72	504.21	501.92	5.61
18.55	264.99	244.48	189.60	53.51	52.37	47.70	503.93	501.64	5.62
19.05	264.83	244.39	193.11	53.51	52.37	47.68	502.00	499.44	5.63
19.55	266.73	243.99	190.35	53.49	52.36	47.67	502.26	500.17	5.65
20.05	268.98	243.74	190.15	53.52	52.36	47.69	501.27	499.72	5.65
20.55	269.53	243.83	192.67	53.54	52.38	47.71	502.84	501.23	5.59
21.05	270.23	243.50	194.69	53.55	52.39	47.70	501.34	499.22	5.59
21.55	271.00	243.21	196.84	53.55	52.37	47.68	500.61	499.10	5.63
22.05	271.40	243.44	194.65	53.57	52.37	47.68	503.23	501.21	5.62

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
22.55	270.64	243.69	202.90	53.62	52.36	47.69	503.12	500.50	5.64
23.05	270.42	243.54	210.92	53.64	52.38	47.65	501.28	498.60	5.64
23.55	270.41	243.39	214.67	53.67	52.38	47.63	501.41	499.77	5.64
24.05	270.82	243.43	211.95	53.72	52.39	47.64	503.31	501.46	5.61
24.55	270.93	243.57	212.30	53.78	52.39	47.60	504.36	500.97	5.59
25.05	270.06	243.49	219.92	53.85	52.44	47.62	502.90	500.24	5.62
25.55	269.48	243.52	223.75	53.96	52.47	47.65	502.53	499.84	5.64
26.05	269.49	243.36	225.14	53.99	52.51	47.61	502.02	499.52	5.64
26.55	269.83	243.23	225.96	54.08	52.52	47.60	501.61	499.32	5.65
27.05	270.28	243.28	226.17	54.17	52.56	47.60	502.43	500.72	5.67
27.55	270.17	243.43	227.42	54.26	52.59	47.61	503.02	500.07	5.59
28.05	269.75	243.61	231.69	54.39	52.62	47.61	503.09	499.94	5.59
28.55	269.06	243.80	235.43	54.54	52.68	47.62	503.83	500.38	5.62
29.05	268.07	244.10	238.14	54.69	52.71	47.62	504.85	500.52	5.63
29.55	267.12	244.40	240.07	54.89	52.76	47.64	505.21	500.56	5.62
30.05	266.54	244.67	241.01	55.12	52.83	47.61	504.77	500.14	5.65
30.55	266.72	245.04	241.62	55.34	52.89	47.63	505.64	500.43	5.66
31.05	267.22	244.96	241.93	55.60	52.92	47.62	505.37	500.46	5.60
31.55	268.13	244.67	241.91	55.90	52.95	47.65	503.73	499.20	5.61
32.05	269.21	244.36	241.91	56.16	52.96	47.69	503.57	501.05	5.61
32.55	270.25	244.07	241.83	56.44	53.00	47.74	502.09	499.49	5.62
33.05	271.46	243.78	241.65	56.70	53.01	47.79	501.99	499.88	5.63
33.55	272.85	243.74	241.78	56.92	53.01	47.82	503.32	501.37	5.66
34.05	272.34	244.09	242.14	57.16	53.02	47.84	505.67	501.25	5.65
34.55	272.37	244.18	242.15	57.48	53.03	47.91	505.19	499.85	5.58
35.05	274.09	243.99	242.02	57.80	53.05	47.94	505.31	502.48	5.59
35.55	275.74	244.11	241.96	58.13	53.06	48.01	504.11	500.06	5.60
36.05	275.63	244.36	242.06	58.52	53.11	48.10	504.24	500.22	5.62
36.55	275.71	244.21	241.91	58.94	53.10	48.13	503.37	499.75	5.62
37.05	275.96	244.08	241.84	59.33	53.08	48.18	502.80	499.58	5.65
37.55	276.26	244.09	241.88	59.72	53.15	48.23	502.71	500.03	5.68
38.05	276.94	244.07	241.90	60.09	53.14	48.27	503.09	500.19	5.60
38.55	276.32	244.27	242.10	60.52	53.18	48.30	503.94	500.21	5.59
39.05	275.95	244.16	241.92	60.97	53.17	48.33	503.13	499.78	5.61
39.55	275.63	244.08	241.91	61.48	53.20	48.38	503.11	499.65	5.64
40.05	275.26	244.04	241.94	61.94	53.18	48.41	503.06	499.60	5.63
40.55	274.91	244.09	242.01	62.47	53.21	48.44	503.51	499.70	5.64
41.05	274.11	244.32	242.20	63.03	53.22	48.50	504.48	500.15	5.65
41.55	273.08	244.56	242.36	63.67	53.23	48.55	505.69	499.62	5.60
42.05	271.74	245.00	242.35	64.45	53.26	48.60	505.21	499.96	5.59
42.55	271.10	245.28	242.50	65.22	53.29	48.65	507.64	501.21	5.61
43.05	269.55	245.38	241.85	66.33	53.35	48.75	500.28	499.31	5.64
43.54	270.91	245.20	241.88	67.15	53.38	48.82	502.36	500.12	5.64
44.05	273.08	245.43	242.22	67.84	53.39	48.85	504.85	500.81	5.66
44.55	274.50	245.26	242.28	68.74	53.40	48.87	504.24	499.74	5.67

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
45.05	276.28	244.98	242.18	69.66	53.41	48.90	504.10	500.37	5.59
45.55	275.57	245.07	242.29	70.52	53.42	48.91	504.77	500.91	5.60
46.05	275.52	245.02	242.17	71.41	53.45	49.00	503.19	499.01	5.62
46.55	275.73	244.48	242.13	72.31	53.47	49.03	503.42	500.89	5.64
47.05	275.94	244.51	242.10	73.17	53.50	49.04	502.89	499.93	5.64
47.55	276.31	244.45	242.03	74.14	53.49	49.11	502.87	501.07	5.64
48.05	276.87	244.49	242.22	74.90	53.52	49.10	505.55	501.03	5.64
48.55	275.43	244.70	242.30	75.95	53.57	49.11	504.59	501.13	5.57
49.05	275.01	244.62	242.25	77.03	53.58	49.20	504.54	500.41	5.58
49.55	274.79	244.54	242.19	78.15	53.61	49.21	504.26	500.33	5.62
50.05	274.24	244.45	242.06	79.36	53.64	49.26	502.71	500.92	5.62
50.55	273.48	244.58	242.18	80.32	53.67	49.29	504.21	501.04	5.63
51.05	272.89	244.54	242.28	81.35	53.70	49.30	504.66	501.21	5.63
51.55	273.14	244.40	242.25	82.55	53.73	49.33	504.52	501.56	5.66
52.05	273.31	244.36	242.23	83.82	53.78	49.38	504.20	499.69	5.59
52.55	273.39	244.32	242.15	85.08	53.81	49.38	503.79	499.59	5.58
53.05	273.53	244.37	242.18	86.36	53.88	49.42	503.82	499.51	5.60
53.55	273.43	244.47	242.26	87.70	53.91	49.45	504.64	501.57	5.63
54.05	272.88	244.78	242.36	89.07	53.96	49.48	505.22	500.26	5.61
54.55	272.07	245.10	242.42	90.59	54.03	49.53	505.83	499.63	5.62
55.05	271.18	245.45	242.52	92.33	54.11	49.58	506.68	499.89	5.66
55.55	270.57	245.81	242.59	94.39	54.28	49.65	507.16	500.13	5.62
56.05	270.89	246.16	242.61	97.03	54.29	49.72	507.35	499.20	5.59
56.55	271.67	245.99	242.52	101.03	54.39	49.78	506.51	500.10	5.61
57.05	273.03	245.79	242.24	106.92	54.52	49.81	503.66	499.83	5.63
57.55	274.97	245.55	242.19	112.09	54.56	49.82	503.96	500.45	5.63
58.05	274.89	245.47	242.36	115.86	54.63	49.85	505.70	501.32	5.65
58.55	275.01	245.40	242.36	119.15	54.72	49.86	504.94	498.96	5.68
59.05	275.14	245.20	242.22	123.56	54.80	49.89	504.26	499.39	5.60
59.55	275.46	245.07	242.18	127.65	54.93	49.94	503.88	499.34	5.59
60.05	275.86	244.95	242.19	131.26	55.01	49.97	503.67	499.25	5.62
60.55	276.25	244.90	242.12	135.24	55.12	49.98	503.25	499.15	5.64
61.05	275.27	245.04	242.24	139.65	55.20	50.01	503.93	500.02	5.64
61.55	275.03	244.96	242.27	143.26	55.33	50.02	503.82	498.99	5.66
62.05	274.77	244.84	242.21	147.67	55.45	50.05	503.61	500.08	5.65
62.55	274.67	244.90	242.27	150.18	55.56	50.08	504.37	499.72	5.59
63.05	274.46	244.95	242.12	154.14	55.68	50.10	504.07	499.42	5.59
63.55	274.34	244.99	242.02	158.21	55.82	50.11	503.72	500.51	5.64
64.05	274.30	244.90	241.85	162.71	55.95	50.12	501.70	498.66	5.61
64.55	274.81	244.78	241.86	162.22	56.07	50.15	501.65	499.59	5.63
65.05	275.51	244.81	241.90	160.13	56.15	50.16	502.04	500.01	5.65
65.55	275.48	244.91	242.04	158.73	56.26	50.15	503.82	501.53	5.64
66.05	274.69	245.09	242.12	159.61	56.38	50.16	503.51	498.52	5.58
66.55	274.14	245.21	242.14	163.37	56.54	50.17	504.14	499.73	5.61
67.05	273.63	245.24	242.30	166.39	56.71	50.16	505.66	501.24	5.64

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
67.55	272.34	245.71	242.41	173.90	56.90	50.21	506.37	499.26	5.64
68.05	270.84	246.22	242.40	192.56	57.20	50.26	506.99	499.51	5.64
68.55	270.16	246.52	242.39	210.59	57.47	50.32	507.33	499.78	5.68
69.05	270.17	246.88	242.38	223.13	57.79	50.37	507.35	499.89	5.62
69.55	270.94	246.79	242.32	230.35	58.12	50.42	506.57	499.64	5.60
70.05	272.26	246.87	242.17	233.26	58.45	50.44	504.82	498.89	5.64
70.55	274.07	246.70	242.05	232.36	58.72	50.47	503.76	500.43	5.65
71.05	275.84	246.38	241.77	230.77	59.00	50.50	501.73	499.81	5.63
71.55	276.55	246.46	241.83	224.89	59.21	50.51	502.77	500.33	5.66
72.05	276.13	246.25	241.91	219.47	59.37	50.50	502.57	500.45	5.63
72.55	276.14	245.97	241.94	214.19	59.55	50.51	502.99	501.24	5.60
73.05	276.27	246.00	242.11	209.13	59.71	50.51	503.95	500.46	5.60
73.55	276.23	246.13	242.12	212.95	59.97	50.52	503.73	499.97	5.64
74.05	275.60	246.32	242.22	216.32	60.26	50.55	504.91	500.32	5.63
74.55	275.18	246.53	242.21	219.55	60.59	50.58	504.87	500.15	5.63
75.05	274.88	246.34	242.27	222.33	60.94	50.61	504.96	500.21	5.66
75.55	274.60	246.29	242.28	225.53	61.27	50.63	504.79	500.19	5.61
76.05	274.43	246.30	242.26	227.31	61.69	50.66	504.88	500.12	5.58
76.55	274.36	246.07	242.25	229.03	62.10	50.69	504.76	500.01	5.60
77.04	274.28	246.17	242.23	230.20	62.47	50.71	504.59	499.98	5.64
77.55	274.00	246.11	242.11	231.86	62.89	50.74	503.55	499.88	5.63
78.05	274.44	246.10	242.01	231.21	63.22	50.81	503.13	499.11	5.65
78.55	274.90	246.09	242.00	230.87	63.55	50.80	503.08	500.32	5.66
79.04	274.60	246.29	242.13	230.65	63.90	50.80	504.40	500.84	5.60
79.55	274.39	246.53	242.19	231.39	64.27	50.83	504.82	499.80	5.57
80.05	273.93	246.61	242.24	233.71	64.75	50.84	505.16	500.26	5.62
80.55	273.24	246.96	242.33	235.63	65.23	50.89	506.23	500.45	5.63
81.05	271.97	247.24	242.48	237.93	65.75	50.93	507.90	500.78	5.63
81.55	270.73	249.02	242.58	239.37	66.34	51.00	508.78	500.00	5.65
82.04	270.14	250.62	242.52	240.04	66.99	51.08	507.95	499.79	5.67
82.55	270.33	251.01	242.47	240.50	67.72	51.17	507.42	499.69	5.60
83.05	271.49	251.48	242.39	240.69	68.46	51.21	506.58	499.58	5.59
83.55	273.37	251.08	242.27	240.59	69.18	51.26	505.43	499.45	5.62
84.05	274.96	251.00	242.17	240.38	69.80	51.30	504.16	499.45	5.63
84.54	276.54	250.82	242.07	240.10	70.33	51.33	503.63	499.40	5.65
85.05	276.69	250.18	242.02	240.09	70.87	51.39	502.93	499.33	5.67
85.55	276.37	250.48	242.03	240.04	71.30	51.42	502.89	498.83	5.64
86.05	276.20	250.54	242.11	239.80	71.73	51.45	503.43	500.43	5.61
86.55	276.15	250.42	242.20	239.75	72.17	51.49	504.33	501.13	5.62
87.05	276.45	250.48	242.28	239.72	72.63	51.50	505.12	502.15	5.65
87.55	275.81	250.74	242.36	240.28	73.18	51.55	505.57	500.13	5.65
88.05	275.49	250.57	242.33	240.58	73.77	51.61	505.60	501.82	5.65
88.55	275.03	250.45	242.32	240.64	74.36	51.66	505.57	500.27	5.67
89.05	274.85	250.33	242.33	240.74	74.97	51.74	505.14	499.80	5.60
89.55	275.01	250.27	242.27	240.67	75.60	51.81	504.89	499.73	5.60

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
90.05	275.34	250.07	242.27	240.73	76.17	51.85	504.67	499.68	5.65
90.55	275.89	250.06	242.28	240.77	76.83	51.92	504.51	499.52	5.64
91.05	274.87	250.23	242.36	240.93	77.42	51.98	505.26	500.01	5.65
91.55	274.80	250.08	242.31	240.82	78.05	52.04	504.92	499.91	5.68
92.05	274.03	250.19	242.10	240.80	78.73	52.17	502.75	499.03	5.61
92.54	274.27	249.89	242.06	240.75	79.41	52.21	503.52	499.51	5.59
93.04	274.53	249.85	242.10	240.81	80.09	52.27	504.10	499.61	5.64
93.55	274.72	250.03	242.25	240.96	80.85	52.32	504.38	500.85	5.65
94.05	273.27	250.56	242.56	241.25	81.45	52.38	507.06	499.11	5.64
94.55	271.78	251.07	242.60	241.72	82.25	52.48	508.16	501.74	5.67
95.04	271.19	251.58	242.79	241.85	83.17	52.61	509.47	499.67	5.65
95.55	270.67	251.80	242.87	242.09	84.26	52.75	510.13	500.07	5.60
96.05	270.45	252.40	242.94	242.21	85.54	52.87	510.84	500.26	5.60
96.55	271.21	252.39	242.93	242.25	86.98	53.05	510.00	500.13	5.64
97.04	273.30	252.12	242.76	242.17	88.54	53.21	508.32	499.49	5.64
97.55	274.93	251.72	242.62	241.96	90.09	53.38	506.73	500.15	5.64
98.05	276.74	251.45	242.54	241.86	91.51	53.50	506.19	500.11	5.69
98.55	276.17	251.50	242.44	241.76	92.95	53.62	504.29	498.32	5.60
99.05	275.78	251.20	242.26	241.67	94.39	53.80	503.56	500.14	5.59
99.55	275.84	250.95	242.25	241.55	95.66	53.87	503.80	500.87	5.64
100.04	276.10	250.76	242.29	241.49	96.76	53.95	504.22	501.21	5.64
100.55	274.75	251.05	242.44	241.64	97.84	53.99	506.05	500.27	5.65
101.05	273.71	250.93	242.50	241.68	99.18	54.11	505.82	500.35	5.65
101.55	273.63	250.62	242.47	241.70	100.63	54.21	505.87	500.22	5.66
102.04	273.64	250.50	242.50	241.75	102.09	54.39	505.86	500.25	5.59
102.54	273.73	250.49	242.49	241.72	103.52	54.53	505.73	500.19	5.61
103.04	273.81	250.40	242.51	241.74	104.97	54.67	505.75	500.17	5.66
103.55	273.89	250.41	242.50	241.75	106.38	54.83	505.81	500.20	5.65
104.05	274.04	250.49	242.49	241.75	107.77	54.95	505.68	500.15	5.65
104.55	274.41	250.26	242.46	241.72	109.14	55.11	505.36	500.03	5.67
105.05	274.79	250.28	242.44	241.73	110.49	55.23	505.30	499.92	5.59
105.54	275.17	250.38	242.45	241.77	111.97	55.39	505.56	499.81	5.58
106.05	273.92	250.58	242.48	241.90	113.38	55.53	504.49	499.86	5.61
106.55	273.71	250.59	242.50	241.94	114.89	55.70	504.95	500.14	5.63
107.05	273.25	250.77	242.58	242.04	116.46	55.84	505.17	500.77	5.64
107.55	272.44	251.23	242.78	242.26	118.12	56.02	507.17	501.66	5.65
108.05	271.08	251.86	242.97	242.48	120.14	56.24	508.45	499.89	5.65
108.55	270.47	252.35	243.01	242.56	122.91	56.53	508.91	499.90	5.58
109.05	270.23	252.63	243.09	242.65	126.62	56.82	509.53	499.27	5.58
109.55	270.67	252.80	243.07	242.64	131.95	57.18	509.21	499.17	5.64
110.05	272.51	252.59	242.97	242.58	139.01	57.55	507.99	499.51	5.64
110.54	274.51	252.18	242.83	242.47	146.51	57.92	506.82	500.53	5.64
111.05	276.10	251.86	242.73	242.39	152.24	58.25	506.89	500.26	5.67
111.55	277.64	251.76	242.65	242.31	156.22	58.52	506.28	500.05	5.63
112.05	276.71	251.73	242.65	242.31	159.26	58.77	506.16	500.06	5.58

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
112.55	276.43	251.48	242.55	242.17	161.87	59.00	505.80	500.28	5.61
113.05	276.02	251.35	242.45	242.13	163.71	59.22	505.21	500.05	5.64
113.55	276.04	251.19	242.44	242.13	164.56	59.40	505.31	500.46	5.61
114.05	276.30	251.10	242.46	242.14	164.70	59.55	505.49	500.48	5.64
114.55	276.74	251.04	242.47	242.18	164.79	59.73	505.63	500.54	5.64
115.05	275.68	251.33	242.58	242.27	165.10	59.92	506.90	500.85	5.60
115.54	275.25	251.18	242.64	242.33	165.85	60.10	507.17	500.41	5.59
116.05	275.03	251.02	242.64	242.36	166.88	60.32	507.24	502.05	5.61
116.54	274.80	250.94	242.68	242.36	168.11	60.55	507.32	499.34	5.64
117.05	274.62	250.89	242.65	242.35	169.90	60.74	507.24	501.37	5.61
117.55	274.61	250.78	242.64	242.34	171.86	60.98	506.96	499.53	5.63
118.04	274.63	250.70	242.59	242.32	174.01	61.21	506.45	499.35	5.68
118.54	274.80	250.63	242.54	242.28	175.99	61.44	506.20	499.56	5.61
119.05	275.18	250.64	242.55	242.26	177.38	61.64	506.22	499.70	5.60
119.55	275.17	250.84	242.59	242.29	178.46	61.85	507.11	499.66	5.62
120.05	273.63	251.12	242.63	242.34	180.23	62.10	505.18	500.08	5.62
120.54	272.96	251.25	242.71	242.44	182.33	62.34	506.22	500.25	5.62
121.05	272.14	251.68	242.93	242.64	184.85	62.59	508.53	500.33	5.63
121.55	271.05	252.30	243.17	242.85	189.04	62.93	510.66	500.40	5.66
122.05	270.59	252.75	243.33	243.01	195.26	63.32	512.16	500.47	5.58
122.55	270.39	253.06	243.48	243.16	202.03	63.78	513.51	500.49	5.58
123.05	270.97	253.25	243.56	243.22	208.47	64.33	513.81	500.50	5.62
123.55	272.67	253.16	243.48	243.15	213.41	64.98	512.50	500.22	5.63
124.05	275.02	252.63	243.32	242.98	216.39	65.63	510.55	499.86	5.63
124.55	276.41	252.35	243.15	242.81	218.82	66.26	508.92	499.68	5.65
125.05	277.32	252.34	242.97	242.67	220.55	66.86	508.10	499.54	5.68
125.55	276.39	252.07	242.90	242.62	221.43	67.44	506.99	499.52	5.61
126.05	275.91	251.99	242.80	242.52	222.08	67.97	506.08	499.46	5.62
126.55	275.71	251.76	242.68	242.38	222.61	68.51	504.96	500.11	5.66
127.05	275.90	251.55	242.60	242.31	222.86	69.00	505.26	499.32	5.65
127.55	276.26	251.55	242.55	242.28	222.83	69.48	505.42	500.11	5.66
128.04	273.46	251.65	242.66	242.39	223.30	69.91	506.19	500.15	5.68
128.54	273.30	251.24	242.68	242.40	223.45	70.41	506.01	500.06	5.60
129.05	273.34	251.21	242.65	242.38	223.88	70.94	505.88	500.04	5.60
129.55	273.42	251.02	242.64	242.37	224.03	71.47	505.60	499.97	5.64
130.05	273.71	250.81	242.59	242.34	224.27	72.03	505.25	499.89	5.63
130.55	274.15	250.83	242.56	242.31	224.24	72.56	504.88	499.82	5.65
131.04	274.78	250.82	242.53	242.28	224.19	73.07	504.63	499.73	5.68
131.55	274.16	251.04	242.57	242.30	224.46	73.58	505.33	499.80	5.62
132.05	273.95	251.13	242.58	242.32	225.13	74.12	505.33	499.75	5.60
132.54	273.93	250.97	242.62	242.33	225.12	74.67	505.37	499.70	5.63
133.05	273.74	251.05	242.62	242.37	225.39	75.23	505.55	499.69	5.63
133.54	273.53	251.13	242.64	242.39	226.15	75.80	505.06	499.68	5.63
134.05	272.02	251.58	242.76	242.49	227.66	76.48	506.36	499.77	5.65
134.55	270.96	252.27	242.92	242.67	229.40	77.20	508.32	500.22	5.65

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
135.05	270.61	252.60	243.18	242.93	230.92	78.03	510.66	500.36	5.59
135.55	270.40	253.18	243.40	243.11	232.99	78.99	512.53	500.53	5.60
136.04	270.42	253.52	243.53	243.22	234.84	80.16	513.44	500.59	5.64
136.55	271.29	253.49	243.59	243.25	236.26	81.51	513.24	500.57	5.62
137.05	272.86	253.01	243.47	243.14	236.83	82.96	511.78	500.20	5.63
137.54	274.07	252.84	243.27	242.95	237.39	84.44	509.89	499.76	5.66
138.04	274.83	252.37	243.06	242.78	237.60	85.90	508.22	499.55	5.63
138.54	275.54	252.04	242.91	242.62	237.62	87.35	506.67	499.47	5.59
139.04	275.85	252.06	242.77	242.50	237.48	88.69	505.59	499.38	5.60
139.55	275.88	252.05	242.67	242.38	237.47	89.97	504.74	499.33	5.64
140.05	275.92	252.01	242.60	242.31	237.37	91.20	504.05	499.27	5.64
140.55	275.88	251.86	242.49	242.23	237.64	92.45	503.08	500.04	5.64
141.05	276.21	251.63	242.43	242.16	237.80	93.55	503.50	499.98	5.67
141.55	276.63	251.40	242.40	242.14	237.74	94.49	502.37	499.87	5.60
142.05	275.18	251.58	242.45	242.22	237.63	95.38	505.13	499.96	5.59
142.55	274.82	251.44	242.48	242.23	237.51	96.37	505.21	499.94	5.63
143.05	274.52	251.41	242.48	242.23	237.71	97.44	505.11	499.90	5.63
143.54	274.31	251.29	242.45	242.22	237.63	98.52	504.91	499.85	5.64
144.05	274.47	250.85	242.44	242.18	237.76	99.60	504.56	499.78	5.65
144.55	275.00	250.76	242.39	242.15	237.83	100.64	504.29	499.69	5.64
145.05	275.53	250.96	242.36	242.14	237.68	101.62	504.15	499.66	5.60
145.54	273.86	251.43	242.45	242.22	237.84	102.57	505.12	499.80	5.62
146.05	272.37	251.76	242.56	242.33	238.38	103.74	504.79	500.04	5.65
146.54	270.84	252.22	242.80	242.55	239.14	105.11	506.94	500.25	5.64
147.05	270.11	252.76	243.00	242.70	240.55	106.97	508.48	500.50	5.65
147.55	269.73	253.14	242.97	242.65	242.02	109.41	507.58	500.29	5.66
148.05	270.75	253.07	242.95	242.67	242.51	112.41	507.76	500.54	5.59
148.55	272.80	252.79	242.92	242.64	242.60	115.91	507.01	500.52	5.59
149.04	274.93	252.42	242.78	242.52	242.55	120.01	505.77	500.07	5.63
149.55	275.89	252.15	242.65	242.38	242.43	124.65	504.29	499.58	5.63
150.04	277.19	251.98	242.49	242.22	242.29	129.26	503.80	499.32	5.65
150.54	277.59	252.11	242.37	242.12	242.26	133.06	503.31	499.30	5.68
151.05	276.30	252.11	242.34	242.08	242.24	136.04	503.73	499.24	5.61
151.54	275.87	251.97	242.29	242.04	242.21	138.28	503.26	499.20	5.59
152.05	275.63	251.83	242.26	242.02	242.17	139.99	502.89	499.14	5.60
152.55	275.54	251.73	242.24	242.01	242.13	140.99	503.03	501.09	5.64
153.05	275.63	251.59	242.28	242.05	242.21	141.09	503.34	499.88	5.64
153.55	275.89	251.56	242.27	242.03	242.20	141.69	503.21	499.52	5.66
154.04	275.64	251.67	242.29	242.06	242.22	142.66	503.73	499.70	5.66
154.55	274.62	251.66	242.29	242.02	242.24	144.12	503.17	498.92	5.59
155.05	274.21	251.48	242.17	241.92	242.24	145.95	502.26	500.08	5.60
155.54	274.05	251.31	242.18	241.93	242.30	146.81	502.31	500.05	5.64
156.05	274.05	251.11	242.18	241.95	242.32	147.23	502.42	500.06	5.62
156.54	274.24	250.90	242.18	241.97	242.33	147.61	502.50	500.09	5.65
157.05	274.60	250.87	242.21	241.97	242.31	148.09	502.53	500.10	5.68

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
157.55	275.11	250.86	242.21	241.96	242.30	148.69	502.53	500.13	5.62
158.05	275.67	250.97	242.21	241.98	242.32	149.37	502.60	500.19	5.60
158.55	274.31	251.29	242.29	242.06	242.42	150.20	503.41	500.52	5.64
159.05	274.06	251.24	242.31	242.08	242.44	151.29	503.57	500.51	5.64
159.55	273.90	251.16	242.33	242.08	242.46	152.53	503.66	500.58	5.64
160.05	273.73	251.14	242.34	242.12	242.50	153.85	503.86	500.64	5.65
160.55	273.06	251.40	242.39	242.18	242.56	155.27	504.73	501.02	5.63
161.05	272.15	251.80	242.53	242.29	242.69	156.93	506.12	501.58	5.59
161.55	270.44	253.02	242.39	242.05	242.58	159.72	503.90	500.21	5.60
162.05	270.30	252.90	242.45	242.21	242.80	163.29	505.55	500.80	5.65
162.55	270.63	253.00	242.68	242.43	243.04	167.89	505.62	501.46	5.63
163.05	271.30	253.00	242.83	242.58	243.19	174.00	505.47	501.74	5.63
163.55	272.62	253.24	242.78	242.46	243.07	182.30	505.77	499.90	5.66
164.05	274.12	252.97	242.42	242.12	242.82	193.08	503.68	500.99	5.62
164.54	276.02	251.97	242.30	242.05	242.77	195.57	503.21	501.68	5.59
165.05	277.66	252.10	242.27	242.06	242.79	194.29	503.17	501.89	5.61
165.55	276.08	252.59	242.31	242.06	242.76	195.01	503.28	500.12	5.63
166.05	274.95	251.75	242.17	241.94	242.66	200.44	501.92	499.87	5.63
166.55	274.64	251.61	242.12	241.87	242.62	201.57	501.56	500.27	5.65
167.04	274.67	251.65	242.09	241.86	242.63	200.46	501.39	500.24	5.66
167.55	274.74	251.46	242.04	241.83	242.58	200.29	500.98	500.20	5.59
168.05	275.05	251.12	242.03	241.77	242.54	199.83	500.68	500.13	5.59
168.54	274.59	251.30	242.08	241.87	242.62	198.40	501.57	500.64	5.63
169.05	274.23	251.50	242.14	241.92	242.70	197.04	501.98	500.18	5.63
169.54	274.25	251.47	242.20	241.98	242.77	195.70	502.54	500.70	5.63
170.04	274.22	251.28	242.25	242.04	242.85	194.36	502.04	500.25	5.67
170.55	274.31	251.07	242.30	242.10	242.89	193.22	502.45	500.56	5.63
171.05	274.07	250.89	242.26	242.03	242.78	193.18	502.86	499.56	5.60
171.55	273.75	251.11	242.18	241.94	242.71	195.23	501.88	499.30	5.62
172.04	273.64	251.35	242.13	241.89	242.66	198.23	501.62	499.99	5.64
172.55	273.55	251.14	242.11	241.90	242.70	199.84	501.55	499.53	5.63
173.05	273.50	250.87	242.12	241.88	242.67	201.48	501.60	499.48	5.66
173.55	273.09	251.20	242.14	241.91	242.75	203.27	502.08	499.67	5.68
174.04	272.20	252.08	242.23	242.02	242.79	205.33	503.29	500.43	5.60
174.54	271.01	252.39	242.40	242.13	242.90	208.31	504.46	499.77	5.60
175.04	270.28	252.39	242.42	242.15	242.87	214.36	504.53	499.16	5.64
175.54	270.21	253.49	242.26	241.96	242.73	222.17	502.90	499.73	5.64
176.05	271.11	253.01	242.30	242.05	242.82	225.61	503.69	499.56	5.64
176.55	272.49	253.19	242.34	242.09	242.88	227.11	503.62	500.38	5.68
177.05	274.24	252.48	242.27	242.00	242.81	228.26	502.61	499.70	5.61
177.55	275.94	252.41	242.13	241.88	242.69	228.77	501.32	499.43	5.58
178.05	277.43	252.07	242.01	241.76	242.60	228.88	500.38	498.74	5.61
178.55	277.15	252.18	241.98	241.74	242.59	228.36	500.48	499.74	5.62
179.04	276.50	251.74	242.02	241.80	242.72	226.36	500.92	500.07	5.62
179.54	276.15	252.08	242.07	241.86	242.70	224.72	501.39	500.56	5.64

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
180.05	276.20	251.35	242.10	241.90	242.72	223.75	501.72	500.80	5.67
180.54	276.46	251.82	242.15	241.92	242.76	223.24	501.84	499.97	5.58
181.05	275.11	252.06	242.17	241.92	242.77	224.80	501.95	499.89	5.58
181.55	274.68	251.38	242.12	241.87	242.73	227.00	501.43	499.37	5.61
182.05	274.09	251.89	241.97	241.71	242.56	228.82	499.92	499.28	5.64
182.54	274.06	250.97	241.92	241.72	242.56	227.19	499.99	499.54	5.63
183.05	274.05	251.18	241.97	241.76	242.62	225.06	500.46	499.65	5.64
183.55	274.25	251.11	241.99	241.78	242.66	224.37	500.58	499.70	5.66
184.05	274.61	250.61	242.00	241.78	242.66	224.50	500.59	499.73	5.59
184.54	275.06	251.09	242.02	241.80	242.66	224.95	500.65	499.74	5.57
185.04	273.72	251.47	242.08	241.86	242.72	226.10	501.33	500.07	5.64
185.54	273.61	250.90	242.08	241.88	242.73	227.46	501.39	500.15	5.64
186.05	273.52	251.36	242.12	241.89	242.75	228.25	501.49	500.19	5.64
186.55	273.11	251.31	242.12	241.93	242.79	228.92	501.93	500.55	5.65
187.05	272.38	251.42	242.22	241.98	242.86	229.89	502.96	500.53	5.63
187.54	271.16	252.48	242.33	242.07	242.90	232.20	503.73	500.30	5.60
188.05	270.21	252.27	242.38	242.10	242.94	235.29	504.18	500.29	5.61
188.54	269.78	253.40	242.42	242.15	242.96	237.60	504.48	500.12	5.64
189.05	269.96	253.26	242.27	241.94	242.75	239.93	502.46	499.41	5.63
189.55	271.37	252.49	242.14	241.89	242.72	240.85	501.70	499.48	5.62
190.04	273.70	251.99	242.15	241.91	242.75	240.96	501.91	499.76	5.65
190.55	275.77	252.80	242.15	241.92	242.79	241.04	502.00	500.84	5.61
191.04	276.89	251.89	242.17	241.95	242.83	240.81	502.17	501.32	5.59
191.55	276.64	252.59	242.15	241.92	242.80	240.70	501.78	500.52	5.62
192.05	276.29	252.26	242.12	241.91	242.77	240.60	501.60	500.45	5.63
192.55	276.00	251.76	242.11	241.89	242.77	240.53	501.53	500.40	5.64
193.05	275.79	252.34	242.11	241.88	242.76	240.53	501.38	500.25	5.65
193.55	275.70	251.26	242.10	241.88	242.74	240.45	501.21	500.15	5.66
194.04	275.58	252.07	242.06	241.85	242.71	240.41	501.10	499.99	5.61
194.55	275.69	251.14	242.05	241.83	242.73	240.45	501.00	499.95	5.60
195.05	276.02	251.93	242.05	241.84	242.71	240.44	500.90	499.84	5.65
195.55	274.99	251.40	242.09	241.89	242.68	240.51	501.39	500.28	5.64
196.05	274.40	251.96	241.95	241.74	242.63	240.61	500.05	500.01	5.66
196.54	274.48	251.23	241.99	241.72	242.60	240.23	500.24	499.46	5.69
197.05	274.26	251.23	241.90	241.67	242.57	240.56	500.29	499.70	5.61
197.55	274.84	250.84	242.00	241.80	242.62	239.18	500.63	500.06	5.60
198.05	274.90	251.25	242.05	241.84	242.74	239.17	501.47	500.33	5.64
198.55	274.22	251.13	242.13	241.93	242.81	240.52	501.70	500.87	5.64
199.05	274.04	251.60	242.20	241.97	242.87	241.07	503.33	501.63	5.64
199.54	274.69	251.23	242.24	242.03	242.94	241.29	503.78	502.24	5.68
200.05	274.75	252.06	242.32	242.14	243.04	241.46	503.81	502.12	5.62
200.54	274.36	252.29	242.46	242.27	243.16	241.73	503.29	501.46	5.60
201.05	273.82	253.12	242.67	242.47	243.27	242.11	504.34	500.64	5.64
201.55	272.31	254.80	242.47	242.13	242.99	242.20	503.94	500.45	5.64
202.05	272.89	255.00	242.33	242.03	242.89	242.28	503.23	499.90	5.65

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
202.54	273.76	255.22	242.24	241.96	242.82	242.28	502.43	499.73	5.68
203.04	275.19	255.00	242.10	241.83	242.66	242.21	501.05	499.71	5.63
203.54	277.17	254.38	242.07	241.84	242.74	242.27	500.95	499.73	5.60
204.05	279.12	253.95	242.02	241.79	242.72	242.29	500.71	499.76	5.65
204.55	279.97	252.70	242.04	241.81	242.74	242.31	500.75	499.86	5.63
205.05	279.71	252.41	242.05	241.83	242.74	242.33	500.96	499.91	5.63
205.54	278.57	252.11	242.03	241.82	242.73	242.32	500.74	499.74	5.65
206.04	277.93	251.86	242.01	241.80	242.71	242.32	500.59	499.66	5.64
206.55	277.55	252.46	242.00	241.77	242.70	242.32	500.44	499.55	5.58
207.05	277.32	252.91	241.99	241.79	242.70	242.33	500.33	499.44	5.60
207.55	277.34	252.32	241.99	241.76	242.69	242.29	500.23	499.42	5.63
208.04	277.42	251.52	241.97	241.76	242.67	242.30	500.17	499.35	5.63
208.54	277.47	251.72	241.96	241.71	242.68	242.30	500.10	499.35	5.64
209.05	277.32	252.64	241.96	241.75	242.68	242.30	500.55	499.42	5.66
209.55	276.49	252.75	241.98	241.79	242.72	242.32	500.38	499.48	5.61
210.05	276.37	251.42	241.97	241.75	242.69	242.31	500.05	499.24	5.57
210.54	276.19	251.26	241.90	241.69	242.64	242.28	499.77	499.66	5.61
211.05	276.48	252.04	241.94	241.71	242.68	242.30	499.86	499.60	5.62
211.55	276.93	251.63	241.96	241.75	242.69	242.34	500.23	499.71	5.62
212.05	276.29	251.33	242.02	241.80	242.75	242.39	501.01	500.05	5.63
212.55	273.99	252.32	242.09	241.84	242.86	242.42	501.09	499.97	5.66
213.05	273.63	252.41	242.02	241.79	242.72	242.38	500.38	499.32	5.59
213.55	273.56	251.46	242.01	241.79	242.74	242.39	500.76	500.29	5.60
214.04	273.09	251.25	242.12	241.89	242.84	242.46	501.91	500.95	5.63
214.55	272.21	252.60	242.27	242.05	242.98	242.61	503.52	501.99	5.63
215.05	271.08	253.95	242.23	241.96	242.88	242.45	502.42	499.73	5.64
215.55	271.37	254.31	242.16	241.91	242.81	242.41	502.06	499.32	5.65
216.05	272.28	254.56	242.17	241.90	242.74	242.42	502.07	499.37	5.65
216.55	273.67	254.68	242.08	241.81	242.74	242.35	501.20	499.50	5.60
217.04	275.80	254.30	242.05	241.82	242.73	242.37	500.81	499.47	5.59
217.55	277.46	254.00	242.02	241.78	242.71	242.37	500.50	499.52	5.65
218.05	278.52	253.70	242.00	241.77	242.72	242.38	500.15	499.11	5.64
218.54	279.73	253.45	241.97	241.75	242.70	242.40	500.28	499.58	5.65
219.05	280.33	253.00	242.01	241.79	242.74	242.40	500.61	499.69	5.69
219.54	278.73	252.32	242.01	241.77	242.72	242.39	500.24	499.19	5.60
220.05	278.10	252.07	241.94	241.72	242.67	242.35	499.87	499.02	5.61
220.55	277.85	251.82	241.92	241.71	242.68	242.35	499.64	499.05	5.65
221.04	277.66	251.68	241.91	241.69	242.66	242.34	499.68	499.09	5.65
221.55	277.53	251.53	241.91	241.71	242.66	242.34	499.70	499.16	5.64
222.05	277.52	251.40	241.91	241.70	242.67	242.34	499.66	498.95	5.69
222.54	277.74	251.33	241.93	241.74	242.70	242.38	500.11	500.02	5.62
223.05	276.94	251.57	242.04	241.83	242.82	242.46	500.92	500.39	5.60
223.54	276.64	252.54	242.06	241.85	242.82	242.48	500.95	500.34	5.64
224.05	276.54	252.49	242.01	241.78	242.75	242.45	500.35	499.68	5.64
224.55	276.40	252.42	241.91	241.68	242.66	242.18	499.53	499.76	5.65

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
225.04	276.80	251.31	241.95	241.75	242.72	241.34	500.41	500.10	5.69
225.55	277.12	251.03	242.02	241.81	242.78	241.57	500.57	499.95	5.62
226.04	277.34	251.08	242.04	241.83	242.80	242.35	501.07	500.04	5.61
226.55	275.58	252.49	242.10	241.87	242.84	242.51	501.26	500.34	5.65
227.05	274.74	253.01	242.12	241.91	242.86	242.55	501.67	500.66	5.64
227.55	273.95	253.21	242.16	241.93	242.90	242.57	502.03	500.63	5.65
228.05	272.92	253.77	242.23	242.00	242.95	242.59	502.77	501.02	5.67
228.54	271.84	253.52	242.31	242.09	243.01	242.67	503.60	501.42	5.63
229.04	271.76	253.60	242.35	242.10	243.03	242.69	503.77	501.12	5.60
229.55	272.66	254.23	242.33	242.08	242.99	242.66	503.26	500.83	5.62
230.05	274.35	254.50	242.23	241.98	242.91	242.60	502.03	500.04	5.63
230.55	276.45	254.12	242.09	241.84	242.80	242.50	500.73	499.28	5.62
231.04	278.29	253.77	241.98	241.73	242.74	242.41	500.32	499.89	5.65
231.55	278.76	253.47	241.93	241.73	242.72	242.40	500.05	499.91	5.65
232.05	279.83	253.25	241.97	241.79	242.76	242.45	500.33	499.90	5.55
232.55	279.38	253.51	242.06	241.85	242.83	242.55	501.14	500.28	5.56
233.05	278.32	253.47	242.08	241.87	242.85	242.55	500.99	500.21	5.65
233.55	277.73	253.32	242.07	241.84	242.79	242.52	500.61	499.79	5.64
234.05	277.40	253.16	242.00	241.80	242.77	242.48	500.28	499.53	5.61
234.55	277.25	252.96	241.98	241.77	242.74	242.47	500.10	499.42	5.64
235.04	275.16	252.71	242.04	241.83	242.81	242.51	500.66	500.03	5.64
235.55	275.14	251.75	242.02	241.81	242.80	242.51	500.44	499.71	5.58
236.05	275.23	251.39	242.01	241.78	242.76	242.49	500.14	499.58	5.59
236.54	275.33	251.09	241.98	241.76	242.73	242.46	499.87	499.47	5.62
237.05	275.38	251.04	241.96	241.74	242.73	242.44	499.86	499.53	5.62
237.54	275.76	250.97	241.96	241.75	242.81	242.46	499.92	499.45	5.61
238.05	276.29	250.97	241.97	241.75	242.74	242.47	499.95	499.65	5.63
238.55	276.98	251.03	241.97	241.77	242.76	242.51	500.29	499.88	5.65
239.04	275.23	251.37	241.94	241.74	242.71	242.42	500.57	499.58	5.57
239.55	275.56	251.09	242.01	241.81	242.78	242.53	500.55	499.74	5.56
240.05	275.44	251.12	242.05	241.85	242.84	242.57	500.95	500.22	5.58
240.54	274.48	251.61	242.14	241.93	242.91	242.64	502.01	500.89	5.63
241.05	272.83	252.26	242.23	242.00	242.95	242.68	502.53	500.80	5.62
241.54	271.79	252.89	242.27	242.02	242.97	242.69	502.82	500.83	5.66
242.05	271.39	253.85	242.29	242.04	242.99	242.69	502.98	500.72	5.68
242.55	271.83	254.57	242.29	242.04	242.98	242.69	502.97	500.65	5.60
243.05	272.91	254.68	242.28	242.01	242.96	242.67	502.40	500.27	5.62
243.55	274.84	254.30	242.16	241.91	242.87	242.60	501.25	499.71	5.65
244.04	277.04	253.84	242.03	241.80	242.79	242.55	500.35	499.31	5.63
244.55	278.22	253.68	241.96	241.77	242.75	242.48	500.29	500.04	5.64
245.05	279.12	253.38	242.02	241.80	242.81	242.56	500.39	499.72	5.67
245.55	279.90	253.31	242.02	241.84	242.83	242.58	500.99	500.18	5.58
246.04	278.42	253.63	242.01	241.78	242.78	242.53	500.16	499.82	5.61
246.54	277.97	253.47	242.05	241.85	242.83	242.60	500.82	500.19	5.64
247.05	277.71	253.28	242.08	241.87	242.87	242.64	500.97	500.26	5.64

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
247.54	277.47	253.19	242.09	241.85	242.84	242.62	500.83	500.02	5.64
248.05	277.22	253.10	242.05	241.82	242.81	242.59	500.47	499.85	5.68
248.55	277.16	252.98	242.00	241.81	242.79	242.58	500.25	499.78	5.63
249.05	277.19	252.93	242.00	241.79	242.78	242.56	500.09	499.56	5.60
249.55	277.32	252.90	241.99	241.78	242.76	242.55	500.26	499.63	5.63
250.04	276.46	252.97	242.03	241.79	242.78	242.57	500.25	499.78	5.64
250.55	276.34	252.02	242.01	241.80	242.78	242.55	500.08	499.63	5.64
251.05	276.45	251.32	241.96	241.76	242.77	242.55	499.85	499.48	5.63
251.55	276.50	251.13	241.96	241.75	242.75	242.50	499.78	499.34	5.64
252.05	276.67	251.29	241.95	241.75	242.77	242.52	499.84	499.56	5.57
252.54	276.85	251.38	241.97	241.72	242.72	242.51	499.75	499.13	5.58
253.05	275.61	251.80	241.95	241.75	242.76	242.54	500.21	499.90	5.63
253.55	275.18	251.95	242.06	241.86	242.85	242.64	501.07	500.39	5.62
254.05	274.06	252.41	242.17	241.96	242.94	242.69	502.17	500.95	5.62
254.54	272.73	253.58	242.28	242.01	242.98	242.75	502.81	499.71	5.65
255.05	271.82	254.45	242.14	241.85	242.80	242.55	501.03	498.85	5.64
255.54	272.22	254.56	242.14	241.91	242.88	242.63	502.07	500.56	5.58
256.05	273.14	254.67	242.29	242.07	243.02	242.77	503.22	501.57	5.59
256.55	274.76	254.54	242.31	242.04	243.04	242.81	502.76	501.21	5.64
257.04	276.56	254.30	242.11	241.84	242.85	242.63	500.51	499.03	5.64
257.55	277.76	253.85	241.97	241.76	242.74	242.55	499.87	499.06	5.64
258.05	278.93	253.44	241.94	241.72	242.71	242.53	499.57	499.00	5.66
258.54	280.03	252.09	241.94	241.73	242.73	242.50	500.08	499.71	5.61
259.05	278.74	251.81	242.07	241.87	242.88	242.68	501.13	500.97	5.58
259.54	277.89	252.19	242.02	241.80	242.79	242.59	500.58	500.40	5.60
260.05	277.70	252.57	242.06	241.86	242.88	242.67	501.04	500.53	5.65
260.55	277.57	250.95	242.13	241.91	243.01	242.74	501.57	501.00	5.64
261.04	277.43	250.85	242.17	241.95	243.01	242.76	501.75	501.18	5.64
261.55	277.61	250.89	242.21	241.96	242.96	242.78	501.82	501.26	5.68
262.04	277.42	251.12	242.17	241.96	242.93	242.73	501.56	499.50	5.60
262.55	276.07	252.33	242.00	241.75	242.75	242.57	499.70	499.04	5.59
263.05	276.00	251.63	241.95	241.73	242.73	242.55	499.59	499.15	5.63
263.55	275.77	250.65	242.00	241.80	242.82	242.61	500.89	500.63	5.63
264.04	274.33	250.45	242.13	241.90	242.92	242.74	501.22	500.71	5.63
264.54	273.93	250.40	242.04	241.79	242.78	242.61	499.84	498.99	5.64
265.05	274.31	250.31	242.01	241.79	242.81	242.62	500.35	500.44	5.63
265.55	274.69	250.17	242.06	241.86	242.85	242.69	500.79	500.63	5.57
266.05	274.84	250.21	242.10	241.90	242.89	242.71	501.12	500.58	5.57
266.54	273.72	250.77	242.08	241.87	242.85	242.66	501.07	500.14	5.63
267.05	273.13	251.50	242.10	241.89	242.89	242.70	501.48	500.43	5.62
267.54	272.47	252.33	242.23	241.98	242.97	242.77	502.46	500.91	5.62
268.05	271.77	254.02	242.29	242.04	243.02	242.81	502.94	500.90	5.65
268.55	271.39	254.76	242.29	242.00	242.94	242.72	502.25	499.45	5.62
269.05	272.31	254.96	242.17	241.90	242.85	242.63	501.30	499.21	5.59
269.54	274.14	254.75	242.10	241.85	242.81	242.62	500.61	499.14	5.60

Table B1. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
270.05	276.41	254.25	242.05	241.81	242.80	242.64	500.07	499.11	5.63
270.55	278.41	253.91	242.00	241.76	242.75	242.59	499.95	499.16	5.63
271.05	279.04	253.71	241.98	241.76	242.77	242.59	499.69	499.09	5.65
271.55	279.98	253.37	241.96	241.73	242.73	242.54	499.52	499.10	5.66
272.04	279.16	251.92	242.00	241.79	242.79	242.61	500.14	499.66	5.59
272.54	278.27	251.83	242.02	241.81	242.79	242.63	500.16	499.53	5.60
273.04	277.77	252.95	242.01	241.75	242.78	242.63	499.94	499.32	5.65
273.55	277.36	251.66	241.92	241.70	242.71	242.49	499.53	499.34	5.64
274.05	277.36	251.34	241.97	241.76	242.78	242.58	499.99	499.45	5.65
274.55	277.35	251.29	242.01	241.83	242.84	242.68	500.52	500.02	5.69
275.04	277.29	251.32	242.07	241.85	242.84	242.70	500.54	500.06	5.61
275.55	277.44	251.49	242.03	241.84	242.84	242.68	500.34	499.77	5.60
276.05	277.79	251.49	242.04	241.82	242.82	242.66	500.47	499.67	5.64
276.55	276.72	251.71	242.06	241.82	242.81	242.67	500.30	499.71	5.63
277.05	276.60	251.46	242.01	241.77	242.76	242.61	499.82	499.41	5.63
277.54	276.46	251.19	241.97	241.76	242.78	242.62	499.71	499.48	5.66
278.05	276.42	250.99	241.97	241.78	242.78	242.62	499.82	499.49	5.62
278.54	276.55	251.05	241.99	241.78	242.78	242.62	499.91	499.67	5.59
279.05	276.23	251.22	242.01	241.80	242.80	242.64	500.44	499.81	5.61
279.55	275.33	251.54	242.05	241.82	242.82	242.68	500.49	499.69	5.63
280.04	274.65	251.90	242.07	241.86	242.83	242.66	500.66	499.67	5.63
280.55	273.46	252.58	242.11	241.91	242.88	242.72	501.31	500.01	5.63
281.05	271.82	254.17	242.08	241.83	242.81	242.61	500.96	499.91	5.67
281.54	272.19	254.44	242.18	241.95	242.90	242.71	501.78	499.61	5.61
282.05	272.80	254.73	242.19	241.94	242.89	242.69	501.64	499.62	5.58
282.54	274.01	254.80	242.13	241.88	242.83	242.67	500.94	499.34	5.61
283.05	275.92	254.41	242.07	241.82	242.82	242.64	500.28	499.11	5.62
283.55	277.56	254.02	242.00	241.78	242.80	242.62	499.94	499.22	5.63
284.04	278.59	253.69	241.98	241.76	242.77	242.61	499.67	499.10	5.65
284.55	279.24	253.55	242.00	241.80	242.81	242.66	500.49	500.45	5.66
285.05	278.40	251.98	242.13	241.93	242.93	242.76	501.34	501.13	5.59
285.55	277.75	252.82	242.11	241.86	242.85	242.70	500.13	498.94	5.61
286.05	277.20	253.40	241.95	241.72	242.72	242.58	499.29	498.83	5.64
286.55	277.18	253.17	241.94	241.72	242.72	242.58	499.41	499.08	5.63
287.04	277.33	251.53	242.01	241.79	242.82	242.67	501.26	500.58	5.65
287.55	277.22	252.07	241.99	241.78	242.80	242.60	500.26	499.90	5.67
288.04	277.35	252.58	242.01	241.80	242.82	242.66	500.16	499.40	5.60

Table B2. Pressure and Temperature Data for Run 2.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
0.05	222.57	53.75	50.08	52.02	51.16	46.51	498.00	499.70	5.55
0.55	237.52	77.59	50.02	51.98	51.08	46.48	503.88	503.69	5.57
1.05	244.81	181.62	50.05	52.03	51.12	46.60	500.25	499.86	5.61
1.54	245.76	230.72	50.12	52.16	51.19	46.67	500.75	500.02	5.58
2.04	248.03	237.96	50.18	52.25	51.32	46.78	500.77	500.03	5.59
2.54	254.58	239.67	50.23	52.17	51.39	46.85	500.44	499.76	5.61
3.04	262.79	240.58	50.26	52.19	51.44	46.90	500.24	499.52	5.62
3.55	268.27	241.44	50.31	52.22	51.50	46.96	500.05	499.30	5.62
4.05	271.43	242.08	50.39	52.24	51.55	46.97	499.65	498.97	5.56
4.55	276.53	242.49	50.46	52.21	51.55	46.95	499.61	498.90	5.54
5.04	285.00	242.81	50.53	52.17	51.51	46.93	500.67	500.09	5.54
5.55	287.89	242.84	50.68	52.15	51.48	46.90	500.83	500.14	5.58
6.05	289.94	242.73	50.85	52.14	51.48	46.88	500.71	500.04	5.61
6.55	288.33	242.67	51.09	52.18	51.50	46.90	500.62	499.93	5.61
7.05	285.39	242.60	51.36	52.19	51.53	46.93	500.40	499.86	5.63
7.54	280.76	242.47	51.68	52.23	51.49	46.97	500.41	499.82	5.65
8.05	278.32	242.32	52.01	52.24	51.58	46.98	500.51	499.61	5.64
8.55	275.40	242.25	52.35	52.22	51.57	46.96	500.29	499.67	5.56
9.05	273.56	242.17	52.73	52.20	51.59	46.97	500.29	499.58	5.56
9.54	272.76	242.09	53.13	52.21	51.60	46.99	500.27	499.53	5.56
10.04	271.82	242.00	53.56	52.19	51.66	46.98	500.26	499.46	5.59
10.55	271.42	242.03	54.01	52.19	51.60	46.96	500.97	500.38	5.60
11.04	270.19	242.10	54.50	52.20	51.59	46.97	501.67	500.66	5.57
11.55	268.66	242.10	55.03	52.20	51.61	46.97	500.77	499.70	5.58
12.05	270.31	242.20	55.63	52.19	51.62	46.99	501.10	500.18	5.59
12.54	271.89	242.30	56.22	52.21	51.62	46.98	501.18	500.23	5.61
13.05	273.06	242.39	56.86	52.18	51.65	46.98	501.26	500.16	5.62
13.55	274.03	242.46	57.54	52.18	51.63	47.01	501.33	500.17	5.56
14.05	274.36	242.58	58.22	52.16	51.60	46.97	501.11	500.15	5.55
14.55	274.20	242.63	58.99	52.15	51.58	46.96	501.43	500.12	5.56
15.04	274.00	242.70	59.80	52.13	51.59	46.92	501.42	500.08	5.59
15.55	273.47	242.78	60.67	52.12	51.59	46.95	501.26	500.02	5.59
16.05	273.01	242.83	61.61	52.10	51.59	46.95	501.54	499.99	5.59
16.54	272.72	242.92	62.63	52.11	51.58	46.95	501.85	500.14	5.60
17.05	272.50	243.00	63.76	52.13	51.61	46.98	501.69	500.08	5.60
17.55	272.30	243.10	64.98	52.10	51.63	46.97	502.23	500.01	5.63
18.04	271.81	243.21	66.34	52.12	51.55	46.99	502.64	500.08	5.61
18.55	271.46	243.31	67.82	52.13	51.62	47.02	502.03	500.01	5.56
19.05	271.21	243.40	69.46	52.13	51.63	47.04	502.23	500.07	5.57
19.55	271.42	243.48	71.21	52.10	51.55	46.98	502.37	500.08	5.58
20.05	271.41	243.57	73.12	52.08	51.53	46.97	502.58	500.13	5.61
20.54	271.48	243.46	75.22	52.06	51.51	46.97	502.65	500.08	5.60
21.05	271.71	243.41	77.36	52.07	51.50	46.98	503.06	499.97	5.60
21.55	271.85	243.62	79.57	52.05	51.48	46.97	502.65	499.98	5.61
22.04	272.64	243.67	81.60	52.04	51.47	46.99	502.60	499.85	5.63

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
22.55	273.34	243.74	83.55	52.02	51.49	47.00	502.76	499.88	5.61
23.04	273.85	243.72	85.37	52.03	51.48	47.00	502.49	499.77	5.57
23.54	274.26	243.75	87.08	52.05	51.57	47.01	502.55	499.84	5.56
24.05	274.39	243.69	88.87	52.04	51.57	47.03	502.60	500.30	5.58
24.55	274.67	243.81	90.41	52.06	51.60	47.04	503.38	500.58	5.62
25.05	274.70	243.83	92.12	52.01	51.50	47.00	503.30	500.50	5.61
25.54	274.62	243.86	93.92	52.01	51.55	46.98	503.41	500.47	5.61
26.05	274.28	243.87	96.05	52.02	51.59	46.99	502.86	499.56	5.63
26.55	274.36	243.79	98.39	52.06	51.67	46.98	503.64	500.27	5.65
27.05	274.10	243.90	100.57	52.07	51.61	47.00	503.90	500.55	5.59
27.54	274.03	243.93	103.06	52.10	51.67	46.97	503.97	500.48	5.56
28.04	273.74	243.96	105.78	52.14	51.70	47.03	504.53	500.52	5.57
28.54	273.46	243.97	108.89	52.17	51.75	47.02	504.20	500.48	5.58
29.04	273.22	243.97	112.31	52.22	51.78	47.04	504.25	500.43	5.61
29.55	273.06	244.00	116.01	52.26	51.76	47.01	505.00	500.44	5.59
30.05	272.89	244.00	120.59	52.27	51.77	47.01	504.65	500.42	5.60
30.54	272.81	243.97	125.68	52.32	51.79	47.02	504.65	500.45	5.61
31.05	272.95	244.09	131.35	52.37	51.80	47.02	505.30	500.45	5.64
31.55	272.93	244.09	137.71	52.45	51.82	47.01	504.82	500.38	5.58
32.05	272.91	244.12	144.33	52.48	51.83	47.04	504.88	500.43	5.56
32.55	272.97	244.10	151.25	52.55	51.87	47.06	504.51	500.05	5.57
33.04	273.24	244.08	157.56	52.64	51.90	47.09	504.33	499.95	5.61
33.55	273.25	244.05	164.25	52.71	51.93	47.18	504.17	499.80	5.62
34.04	273.41	244.05	170.53	52.80	51.95	47.24	503.94	499.87	5.61
34.54	273.59	244.05	175.99	52.89	51.98	47.31	504.21	499.96	5.61
35.05	273.76	244.04	179.83	52.98	52.01	47.36	504.24	499.90	5.64
35.55	273.94	244.02	183.82	53.09	52.03	47.41	504.14	499.86	5.64
36.05	273.83	244.05	187.80	53.20	51.97	47.47	504.61	499.83	5.58
36.55	273.89	244.03	191.28	53.33	52.10	47.50	503.96	499.72	5.58
37.05	273.75	244.06	195.36	53.44	52.11	47.55	504.39	499.87	5.60
37.55	273.62	244.04	199.01	53.57	52.12	47.61	504.32	499.74	5.62
38.05	273.68	244.05	202.98	53.70	52.14	47.64	504.56	499.91	5.62
38.54	273.43	244.10	207.30	53.85	52.17	47.67	504.70	499.95	5.61
39.05	273.57	244.04	211.06	54.01	52.19	47.71	504.72	499.87	5.63
39.55	273.38	244.09	214.96	54.18	52.22	47.74	505.22	500.68	5.64
40.04	273.20	244.14	218.33	54.33	52.22	47.77	505.33	500.61	5.60
40.54	273.21	244.19	221.27	54.53	52.23	47.83	505.57	500.53	5.57
41.04	273.05	244.24	224.43	54.70	52.27	47.88	505.75	500.80	5.58
41.54	272.77	244.26	226.56	54.92	52.28	47.90	506.00	500.90	5.63
42.05	273.04	244.25	228.27	55.13	52.29	47.95	506.59	500.80	5.62
42.55	273.11	244.25	229.59	55.35	52.31	48.00	506.37	500.29	5.61
43.05	272.87	244.24	231.09	55.61	52.32	48.03	505.74	500.43	5.64
43.54	272.92	244.24	232.23	55.86	52.34	48.09	505.55	500.30	5.66
44.05	272.93	244.23	232.93	56.12	52.35	48.12	505.38	500.25	5.57
44.55	273.29	244.23	233.98	56.38	52.37	48.14	505.96	500.25	5.57

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
45.05	273.17	244.23	234.82	56.66	52.38	48.21	505.65	500.35	5.60
45.55	273.53	244.17	235.33	56.96	52.40	48.26	505.25	500.14	5.63
46.04	273.49	244.15	236.60	57.28	52.39	48.29	503.23	500.14	5.61
46.55	273.34	244.02	236.29	57.61	52.43	48.33	503.46	498.71	5.61
47.04	273.86	243.98	236.11	57.91	52.42	48.36	504.60	500.52	5.62
47.55	274.11	244.04	236.35	58.19	52.42	48.38	505.67	500.40	5.66
48.04	273.99	244.11	236.85	58.53	52.39	48.39	505.58	500.64	5.59
48.54	273.79	244.12	237.85	58.91	52.44	48.44	504.41	498.50	5.57
49.04	273.63	244.03	238.12	59.30	52.44	48.48	504.33	500.25	5.59
49.55	274.09	244.08	238.17	59.64	52.46	48.51	505.46	500.46	5.63
50.05	273.74	244.17	238.81	60.01	52.45	48.53	505.60	500.30	5.61
50.55	273.56	244.23	239.12	60.44	52.50	48.56	506.36	500.63	5.61
51.05	273.21	244.28	239.91	60.85	52.48	48.61	506.36	499.06	5.62
51.55	273.12	244.21	240.07	61.34	52.51	48.64	506.14	499.75	5.66
52.05	273.26	244.24	240.38	61.77	52.53	48.70	506.16	499.44	5.60
52.55	272.91	244.31	240.70	62.24	52.62	48.73	506.73	499.98	5.57
53.05	272.66	244.23	240.75	62.77	52.56	48.76	505.27	500.12	5.58
53.55	273.10	244.21	240.85	63.22	52.59	48.80	507.19	500.48	5.62
54.05	273.04	244.31	241.10	63.70	52.61	48.87	506.62	499.06	5.61
54.55	273.06	244.31	241.31	64.25	52.62	48.88	506.43	499.01	5.62
55.05	273.18	244.30	241.43	64.81	52.63	48.92	506.98	499.45	5.63
55.54	273.34	244.28	241.54	65.35	52.59	48.95	506.57	499.37	5.63
56.04	273.76	244.31	241.58	65.92	52.68	49.00	507.18	500.57	5.59
56.55	273.83	244.32	241.67	66.50	52.70	49.02	506.71	499.70	5.56
57.04	273.86	244.28	241.61	67.11	52.73	49.05	506.45	499.29	5.56
57.54	273.86	244.26	241.66	67.75	52.74	49.08	507.09	499.69	5.59
58.05	273.89	244.24	241.67	68.41	52.72	49.12	506.58	499.87	5.61
58.55	273.94	244.25	241.74	69.08	52.83	49.15	506.93	499.86	5.60
59.04	274.15	244.23	241.79	69.79	52.82	49.18	506.72	499.83	5.61
59.55	273.82	244.19	241.70	70.54	52.86	49.20	505.64	499.87	5.61
60.05	273.82	244.15	241.71	71.27	52.87	49.23	505.76	500.57	5.64
60.55	273.85	244.18	241.81	72.04	52.92	49.26	507.21	500.72	5.60
61.05	273.88	244.26	241.88	72.82	52.94	49.28	507.30	499.21	5.57
61.55	273.41	244.33	241.97	73.70	52.97	49.29	507.35	500.42	5.57
62.05	273.28	244.31	241.94	74.56	53.00	49.33	508.01	500.53	5.60
62.55	273.47	244.40	242.04	75.50	53.04	49.34	508.44	500.41	5.61
63.05	273.21	244.48	242.13	76.47	53.09	49.37	509.04	500.43	5.61
63.54	272.99	244.51	242.20	77.51	53.12	49.41	509.02	500.51	5.61
64.04	273.13	244.52	242.21	78.60	53.17	49.48	509.39	500.53	5.62
64.55	272.89	244.56	242.22	79.77	53.24	49.45	509.14	499.92	5.65
65.04	272.87	244.57	242.24	81.06	53.28	49.51	509.08	500.04	5.57
65.55	273.06	244.47	242.25	82.48	53.35	49.54	509.16	499.91	5.55
66.05	273.13	244.52	242.25	84.01	53.34	49.57	509.04	499.89	5.58
66.54	273.02	244.48	242.19	85.68	53.49	49.59	508.28	500.08	5.61
67.05	272.10	244.43	242.13	87.51	53.56	49.64	507.52	500.56	5.60

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
67.55	272.09	244.37	242.14	89.40	53.65	49.65	508.33	499.41	5.61
68.05	271.94	244.40	242.19	91.39	53.73	49.67	508.60	499.66	5.60
68.55	271.90	244.36	242.15	93.51	53.79	49.70	507.90	499.50	5.63
69.05	272.11	244.33	242.15	95.66	53.96	49.70	507.94	500.05	5.64
69.55	271.35	244.35	242.20	97.83	53.98	49.75	508.02	500.03	5.57
70.05	269.62	244.31	242.21	99.97	54.07	49.74	507.83	499.99	5.57
70.55	271.54	244.28	242.19	102.14	54.16	49.78	507.84	499.94	5.59
71.05	272.38	244.34	242.24	104.30	54.25	49.79	508.26	499.97	5.61
71.54	272.78	244.37	242.25	106.47	54.34	49.83	508.19	499.95	5.61
72.05	273.01	244.42	242.30	108.72	54.43	49.80	508.98	499.98	5.61
72.54	268.93	244.45	242.37	111.07	54.54	49.86	509.12	500.09	5.62
73.05	271.00	244.50	242.40	113.65	54.67	49.83	509.50	500.14	5.65
73.55	271.79	244.55	242.45	116.44	54.76	49.89	510.12	500.17	5.59
74.05	272.14	244.58	242.41	119.61	54.91	49.90	508.95	500.08	5.54
74.54	269.51	244.47	242.34	123.29	55.04	49.95	508.38	500.47	5.58
75.05	271.27	244.52	242.51	127.06	55.15	49.95	510.22	500.48	5.61
75.55	272.46	244.62	242.61	130.89	55.27	49.95	510.82	500.49	5.61
76.05	273.01	244.71	242.68	135.13	55.42	50.00	511.04	500.29	5.61
76.55	273.46	244.72	242.68	139.88	55.57	50.01	510.89	500.26	5.61
77.04	273.63	244.77	242.66	144.99	55.74	50.03	510.55	500.18	5.65
77.55	273.86	244.64	242.62	150.06	55.98	50.04	510.29	500.00	5.62
78.05	274.07	244.60	242.61	154.64	56.05	50.08	509.83	499.91	5.56
78.55	274.36	244.55	242.61	158.75	56.22	50.09	509.73	500.19	5.56
79.05	271.69	244.54	242.64	162.18	56.39	50.13	510.07	500.15	5.59
79.54	272.84	244.45	242.58	165.15	56.55	50.12	509.28	500.00	5.61
80.05	273.36	244.46	242.60	167.77	56.68	50.14	509.62	499.99	5.60
80.55	273.66	244.39	242.49	170.63	56.87	50.15	508.55	500.18	5.62
81.04	273.80	244.35	242.50	173.11	57.09	50.17	508.62	500.23	5.64
81.55	273.65	244.40	242.60	175.19	57.28	50.20	509.46	500.47	5.64
82.04	273.54	244.48	242.69	177.38	57.35	50.20	510.19	500.38	5.58
82.54	272.96	244.55	242.74	179.96	57.54	50.22	510.90	500.10	5.57
83.04	270.78	244.59	242.79	183.53	57.72	50.23	510.96	500.11	5.58
83.55	271.75	244.60	242.83	187.03	57.97	50.24	511.33	500.16	5.62
84.05	272.20	244.70	242.89	190.54	58.19	50.26	511.95	500.32	5.60
84.54	272.26	244.74	242.94	194.44	58.45	50.30	512.37	500.34	5.60
85.05	272.46	244.81	242.99	198.41	58.73	50.33	513.22	500.37	5.61
85.55	270.78	244.86	243.03	202.76	59.03	50.36	513.27	500.14	5.63
86.05	268.85	244.83	243.06	207.19	59.35	50.40	513.12	500.13	5.62
86.55	271.35	244.81	243.04	210.75	59.69	50.40	513.21	500.02	5.56
87.05	272.61	244.79	243.00	213.20	60.05	50.43	512.68	499.90	5.56
87.55	273.18	244.72	242.87	215.56	60.50	50.46	511.35	499.97	5.56
88.05	273.68	244.62	242.83	217.31	60.80	50.48	511.14	500.07	5.61
88.55	273.50	244.59	242.83	218.47	61.19	50.52	511.15	500.20	5.59
89.04	271.10	244.55	242.82	219.40	61.57	50.53	510.91	500.16	5.59
89.54	272.88	244.54	242.82	220.29	61.98	50.55	510.94	500.16	5.60

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
90.05	273.90	244.49	242.78	221.38	62.37	50.58	510.75	500.02	5.62
90.54	274.33	244.45	242.76	221.97	62.79	50.60	510.43	500.02	5.64
91.05	274.49	244.46	242.76	223.02	63.20	50.63	510.63	499.99	5.58
91.55	274.53	244.48	242.77	224.31	63.63	50.65	510.74	499.96	5.55
92.05	274.29	244.53	242.82	225.47	64.08	50.66	511.18	500.07	5.56
92.54	274.21	244.56	242.86	226.88	64.57	50.70	511.36	500.11	5.60
93.05	273.99	244.61	242.91	228.02	65.06	50.73	511.88	500.17	5.61
93.55	273.50	244.72	242.99	229.34	65.59	50.75	512.61	500.24	5.62
94.05	273.27	244.75	243.04	230.86	66.17	50.78	513.19	500.20	5.63
94.55	269.93	244.82	243.04	232.20	66.77	50.84	512.71	499.88	5.65
95.04	270.54	244.78	243.02	233.61	67.35	50.87	512.98	500.06	5.63
95.55	272.18	244.83	243.09	234.16	68.16	50.93	513.74	500.29	5.58
96.05	273.13	244.88	243.18	234.91	68.91	50.96	514.40	500.34	5.59
96.55	273.43	244.98	243.19	235.68	69.70	51.02	514.44	500.32	5.62
97.04	273.86	244.91	243.17	236.23	70.54	51.05	514.28	500.20	5.61
97.54	274.06	244.87	243.15	236.68	71.41	51.10	514.04	500.05	5.60
98.04	274.18	244.79	243.07	237.36	72.32	51.14	513.31	499.90	5.61
98.54	274.97	244.72	243.00	237.59	73.23	51.21	512.76	499.76	5.64
99.05	275.70	244.68	242.96	237.92	74.14	51.21	512.11	499.66	5.62
99.55	276.46	244.61	242.90	238.21	75.04	51.30	511.70	499.56	5.56
100.04	276.91	244.59	242.88	238.22	75.94	51.32	511.55	499.89	5.57
100.55	277.24	244.55	242.86	238.38	76.84	51.33	511.29	499.80	5.60
101.05	277.24	244.62	242.86	238.58	77.75	51.39	511.35	499.72	5.63
101.55	276.75	244.60	242.86	239.11	78.73	51.44	511.17	499.99	5.61
102.05	276.17	244.57	242.87	239.39	79.66	51.48	511.66	499.88	5.61
102.54	275.86	244.66	242.94	239.55	80.67	51.55	512.13	500.72	5.63
103.05	275.16	244.77	243.04	239.66	81.66	51.60	513.07	500.73	5.65
103.55	274.88	244.82	243.13	239.94	82.83	51.64	513.78	500.74	5.58
104.04	274.67	244.90	243.18	240.55	83.90	51.69	514.45	500.29	5.57
104.54	274.07	244.99	243.27	241.06	85.15	51.75	515.09	500.25	5.56
105.05	273.92	245.02	243.32	241.49	86.45	51.82	515.61	500.27	5.62
105.54	274.04	245.09	243.37	241.78	87.88	51.87	516.15	500.30	5.60
106.04	273.92	245.12	243.42	241.93	89.37	51.93	516.31	500.44	5.60
106.55	274.15	245.12	243.42	242.06	90.95	52.02	516.19	500.42	5.61
107.05	274.43	245.12	243.38	242.13	92.59	52.07	516.01	500.11	5.65
107.55	274.61	245.05	243.34	242.16	94.28	52.15	515.43	499.88	5.63
108.05	275.11	244.97	243.27	242.17	96.02	52.22	514.64	499.73	5.57
108.55	275.22	244.93	243.23	242.21	97.78	52.33	514.33	499.68	5.58
109.05	275.29	244.80	243.08	242.15	99.63	52.42	512.68	499.89	5.61
109.55	275.48	244.71	243.01	242.11	101.39	52.50	512.21	499.87	5.62
110.05	275.41	244.67	243.01	242.13	103.15	52.63	511.99	500.19	5.61
110.54	275.73	244.63	242.99	242.12	104.88	52.70	512.01	500.08	5.62
111.05	275.49	244.67	243.00	242.16	106.60	52.81	512.22	500.11	5.65
111.55	275.24	244.66	243.01	242.19	108.33	52.90	512.30	500.12	5.64
112.05	275.29	244.66	243.03	242.22	110.06	52.98	512.65	500.11	5.58

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
112.54	275.05	244.73	243.08	242.29	111.82	53.11	512.90	500.19	5.58
113.04	274.42	244.83	243.15	242.38	113.59	53.24	513.41	500.23	5.61
113.55	274.02	244.85	243.22	242.46	115.42	53.37	514.07	500.24	5.61
114.04	273.82	244.90	243.29	242.55	117.31	53.48	514.72	500.30	5.63
114.55	273.43	245.00	243.36	242.64	119.28	53.61	515.36	500.27	5.62
115.05	273.39	245.06	243.41	242.73	121.29	53.78	515.96	500.33	5.65
115.54	273.16	245.07	243.42	242.74	123.43	53.94	515.78	500.01	5.65
116.04	273.21	245.07	243.44	242.79	125.62	54.13	515.81	499.19	5.58
116.55	273.60	245.08	243.45	242.82	127.83	54.34	516.04	499.57	5.57
117.05	273.69	245.10	243.47	242.86	130.08	54.54	515.91	499.66	5.59
117.55	274.14	245.08	243.41	242.84	132.33	54.75	515.55	499.66	5.63
118.04	274.60	245.00	243.37	242.78	134.57	54.99	515.11	499.90	5.63
118.55	274.92	244.93	243.31	242.74	136.70	55.24	514.60	499.78	5.62
119.05	275.07	244.89	243.26	242.72	138.88	55.46	513.94	499.68	5.63
119.55	275.19	244.82	243.20	242.65	140.97	55.71	513.40	499.57	5.63
120.05	275.11	244.74	243.13	242.59	142.96	55.97	513.01	499.47	5.58
120.54	275.31	244.68	243.07	242.57	144.89	56.21	512.40	499.36	5.54
121.05	275.11	244.66	243.03	242.53	146.73	56.46	512.08	500.26	5.57
121.55	275.05	244.64	243.05	242.53	148.47	56.72	511.99	500.25	5.62
122.05	274.81	244.66	243.08	242.54	150.18	57.00	512.33	500.35	5.61
122.54	274.45	244.69	243.08	242.54	151.85	57.25	511.77	500.30	5.61
123.04	274.18	244.61	242.98	242.48	153.47	57.55	511.41	499.95	5.61
123.54	274.19	244.63	243.01	242.51	155.08	57.85	511.90	500.56	5.65
124.04	273.74	244.77	243.12	242.60	156.65	58.15	512.95	500.04	5.63
124.55	273.59	244.71	243.21	242.69	158.23	58.50	513.56	500.14	5.57
125.05	273.71	244.85	243.22	242.72	159.86	58.88	513.84	500.24	5.58
125.55	273.42	244.85	243.29	242.77	161.53	59.28	514.09	500.34	5.58
126.05	273.71	244.90	243.29	242.77	163.29	59.69	514.14	500.33	5.60
126.55	273.74	244.94	243.30	242.80	165.20	60.14	514.36	500.40	5.60
127.05	273.86	244.88	243.28	242.78	167.18	60.65	514.00	500.28	5.60
127.55	274.17	244.82	243.23	242.72	169.19	61.18	513.26	500.17	5.60
128.05	274.51	244.78	243.15	242.67	171.28	61.68	512.76	500.05	5.63
128.54	274.65	244.69	243.09	242.59	173.33	62.25	511.96	500.20	5.64
129.05	274.94	244.60	243.00	242.50	175.39	62.81	511.00	500.19	5.57
129.55	274.99	244.52	242.89	242.41	177.38	63.42	510.22	500.09	5.56
130.04	275.09	244.36	242.82	242.33	179.21	64.00	509.79	500.07	5.57
130.55	275.05	244.30	242.78	242.29	180.81	64.55	509.63	499.97	5.61
131.04	274.96	244.34	242.74	242.27	182.26	65.09	509.19	499.92	5.61
131.54	274.92	244.33	242.75	242.27	183.55	65.64	509.05	499.98	5.61
132.05	274.81	244.31	242.75	242.27	184.78	66.22	509.01	499.96	5.62
132.55	274.75	244.33	242.75	242.25	186.02	66.78	509.05	499.96	5.67
133.05	274.70	244.34	242.75	242.26	187.18	67.36	509.08	499.96	5.62
133.54	274.48	244.38	242.80	242.30	188.36	67.98	509.59	500.07	5.57
134.05	274.10	244.41	242.83	242.31	189.59	68.62	509.70	500.07	5.58
134.55	274.15	244.42	242.83	242.34	190.86	69.30	510.17	500.09	5.61

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
135.05	273.64	244.49	242.88	242.38	192.22	70.01	510.31	500.13	5.62
135.55	273.57	244.44	242.82	242.32	193.85	70.78	509.58	500.08	5.61
136.04	273.54	244.43	242.78	242.28	195.76	71.61	509.41	500.09	5.62
136.55	273.42	244.52	242.83	242.35	197.68	72.45	509.93	500.13	5.65
137.05	273.81	244.44	242.83	242.35	199.32	73.35	509.73	500.21	5.64
137.54	274.08	244.42	242.83	242.33	201.09	74.29	509.70	500.10	5.58
138.05	274.22	244.40	242.81	242.32	202.90	75.24	509.45	500.08	5.57
138.54	274.47	244.37	242.75	242.29	204.67	76.24	509.06	499.96	5.59
139.04	275.00	244.38	242.73	242.25	206.33	77.25	508.54	499.85	5.62
139.55	274.97	244.29	242.67	242.19	208.03	78.24	508.17	499.85	5.61
140.05	275.14	244.20	242.62	242.13	209.46	79.26	507.66	499.72	5.62
140.55	275.00	244.16	242.58	242.10	210.69	80.27	507.27	500.11	5.63
141.05	274.94	244.08	242.52	242.06	211.71	81.25	506.90	499.99	5.66
141.55	275.06	244.06	242.50	242.04	212.58	82.20	506.89	499.96	5.62
142.05	274.77	243.99	242.50	242.03	213.53	83.15	506.81	500.04	5.57
142.55	274.66	244.02	242.50	242.03	214.40	84.14	506.93	500.03	5.58
143.04	274.39	243.93	242.30	241.85	216.94	85.14	504.84	500.38	5.61
143.55	274.08	243.93	242.35	241.88	218.35	86.02	505.54	500.19	5.62
144.05	274.17	243.94	242.40	241.92	219.14	86.93	505.84	500.44	5.61
144.55	274.26	244.01	242.45	241.99	219.78	87.90	506.47	500.29	5.61
145.04	274.00	244.08	242.54	242.07	220.44	88.98	507.16	500.49	5.64
145.55	273.91	244.17	242.59	242.12	221.58	90.13	507.70	500.58	5.65
146.05	273.96	244.22	242.62	242.16	223.22	91.39	508.12	499.77	5.58
146.54	273.69	244.20	242.60	242.15	225.71	92.77	507.50	499.61	5.58
147.04	273.99	244.18	242.58	242.10	227.77	94.20	507.36	500.65	5.59
147.55	273.97	244.19	242.62	242.15	229.25	95.61	507.74	500.62	5.62
148.05	274.27	244.17	242.61	242.13	229.96	97.03	507.58	500.58	5.61
148.55	274.45	244.17	242.59	242.13	231.29	98.46	507.27	499.74	5.61
149.04	274.57	244.11	242.54	242.10	232.61	99.98	506.77	500.13	5.61
149.55	274.41	244.00	242.37	241.92	234.83	101.47	505.07	500.37	5.66
150.05	274.82	243.87	242.31	241.89	235.09	102.75	505.13	500.25	5.62
150.55	274.75	243.89	242.33	241.90	235.29	104.00	505.29	500.34	5.57
151.05	274.76	243.90	242.34	241.90	235.36	105.37	505.20	500.42	5.57
151.54	274.96	243.87	242.34	241.88	235.42	106.71	505.07	499.63	5.62
152.05	274.68	243.90	242.32	241.91	235.67	108.21	505.01	499.63	5.60
152.55	274.84	243.86	242.34	241.89	236.06	109.62	505.06	499.61	5.61
153.04	274.68	243.88	242.34	241.87	236.22	111.06	505.05	499.79	5.62
153.54	274.49	243.87	242.33	241.90	236.56	112.49	505.02	499.81	5.63
154.04	274.26	243.87	242.35	241.90	237.06	113.94	505.36	499.81	5.65
154.54	274.13	243.94	242.34	241.91	237.42	115.37	505.26	499.84	5.57
155.05	273.78	243.87	242.40	241.96	238.04	116.86	505.72	499.93	5.57
155.55	273.77	243.95	242.39	241.96	238.56	118.40	505.77	499.93	5.57
156.05	273.82	243.95	242.41	241.96	239.07	119.99	505.74	499.94	5.62
156.54	273.56	243.91	242.30	241.87	240.20	121.70	504.38	500.15	5.61
157.05	273.81	243.86	242.30	241.85	240.74	123.18	505.08	500.11	5.63

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
157.55	274.01	243.91	242.37	241.92	240.91	124.75	505.98	500.16	5.64
158.05	273.86	243.94	242.38	241.95	241.13	126.61	505.35	500.16	5.67
158.55	273.89	243.90	242.38	241.95	241.37	128.40	505.44	500.10	5.60
159.04	274.45	243.86	242.36	241.94	241.46	130.19	505.70	500.05	5.58
159.55	274.52	243.86	242.35	241.92	241.53	132.01	505.12	500.02	5.60
160.05	274.82	243.84	242.33	241.90	241.60	133.79	504.88	499.90	5.63
160.54	275.07	243.71	242.30	241.88	241.63	135.47	504.68	499.89	5.63
161.04	275.09	243.74	242.26	241.84	241.68	137.12	504.43	499.84	5.64
161.55	275.08	243.63	242.24	241.81	241.68	138.72	503.98	499.72	5.66
162.04	275.03	243.68	242.20	241.78	241.69	140.24	503.91	499.66	5.67
162.55	274.86	243.65	242.19	241.78	241.71	141.71	503.75	499.71	5.59
163.05	274.77	243.63	242.19	241.78	241.74	143.14	503.79	499.67	5.59
163.55	274.50	243.62	242.12	241.67	241.70	144.61	501.92	499.26	5.63
164.05	274.29	243.50	242.02	241.63	241.92	145.77	502.39	500.01	5.62
164.55	274.38	243.53	242.09	241.68	242.00	146.60	502.92	500.02	5.60
165.05	274.04	243.62	242.14	241.73	242.09	147.67	503.46	500.14	5.61
165.55	273.94	243.63	242.20	241.78	242.16	148.82	503.93	500.21	5.63
166.05	274.18	243.66	242.25	241.82	242.19	150.05	504.45	500.20	5.65
166.54	273.89	243.73	242.28	241.89	242.26	151.37	504.88	500.23	5.60
167.04	273.69	243.75	242.30	241.90	242.31	152.76	504.72	500.16	5.59
167.55	273.72	243.78	242.31	241.92	242.35	154.22	504.73	500.13	5.62
168.04	273.63	243.78	242.29	241.90	242.38	155.79	504.71	500.06	5.64
168.54	273.79	243.76	242.29	241.88	242.38	157.44	504.44	499.96	5.62
169.05	274.22	243.70	242.25	241.86	242.38	159.11	504.24	499.90	5.62
169.54	274.05	243.72	242.25	241.87	242.41	160.82	504.24	499.91	5.65
170.05	274.45	243.68	242.21	241.85	242.41	162.50	503.86	499.80	5.64
170.55	274.64	243.62	242.21	241.81	242.39	164.10	503.67	499.72	5.58
171.05	274.42	243.48	241.97	241.61	242.22	165.77	501.63	499.97	5.59
171.55	274.71	243.42	242.01	241.63	242.27	166.96	502.16	500.00	5.61
172.04	275.01	243.38	242.00	241.64	242.29	167.95	502.20	500.00	5.63
172.55	274.87	243.43	242.05	241.68	242.36	168.77	502.38	500.05	5.61
173.05	275.04	243.47	242.07	241.71	242.41	169.58	502.67	500.09	5.62
173.55	275.17	243.48	242.10	241.73	242.44	170.41	503.02	500.15	5.64
174.05	274.78	243.53	242.12	241.78	242.46	171.30	503.17	500.16	5.65
174.54	274.53	243.59	242.13	241.78	242.49	172.29	503.11	500.11	5.59
175.05	274.26	243.55	242.15	241.79	242.53	173.33	503.38	500.11	5.57
175.55	274.31	243.55	242.16	241.82	242.54	174.46	503.36	500.12	5.60
176.04	274.14	243.56	242.18	241.82	242.56	175.68	503.49	500.10	5.62
176.55	273.84	243.59	242.20	241.84	242.57	176.95	503.81	500.19	5.61
177.05	273.64	243.63	242.21	241.85	242.59	178.35	503.83	500.10	5.63
177.54	273.24	243.46	241.99	241.65	242.37	179.99	501.67	499.94	5.63
178.05	273.65	243.44	242.05	241.69	242.48	181.29	502.62	500.07	5.66
178.55	273.90	243.51	242.12	241.79	242.64	182.48	503.21	500.20	5.60
179.05	273.99	243.53	242.13	241.79	242.54	183.82	502.98	500.12	5.58
179.55	274.11	243.54	242.15	241.80	242.56	185.25	503.28	500.19	5.59

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
180.05	274.41	243.54	242.13	241.79	242.59	186.79	503.19	500.09	5.64
180.55	274.61	243.54	242.14	241.82	242.59	188.40	503.12	500.09	5.60
181.05	274.75	243.52	242.14	241.78	242.57	189.96	503.06	499.87	5.61
181.55	274.89	243.46	242.08	241.76	242.53	191.43	502.60	499.73	5.62
182.05	274.93	243.44	242.08	241.74	242.55	192.79	502.52	499.74	5.65
182.54	274.92	243.42	242.06	241.74	242.52	193.95	502.30	499.59	5.60
183.05	274.89	243.40	242.06	241.72	242.52	194.99	502.20	499.58	5.56
183.55	274.97	243.38	242.04	241.71	242.52	195.92	502.32	499.53	5.57
184.05	274.86	243.40	242.04	241.73	242.52	196.79	502.32	500.07	5.61
184.54	274.52	243.40	242.01	241.69	242.44	197.51	501.39	500.12	5.62
185.04	274.41	243.34	241.98	241.67	242.50	198.42	501.91	500.15	5.61
185.54	274.60	243.37	242.04	241.71	242.56	199.02	502.57	500.25	5.61
186.04	274.17	243.44	242.06	241.76	242.58	199.79	502.57	500.29	5.65
186.55	274.08	243.46	242.11	241.79	242.61	200.83	503.03	500.41	5.64
187.05	273.82	243.51	242.16	241.84	242.68	202.24	503.40	500.48	5.58
187.54	273.89	243.54	242.16	241.86	242.68	204.03	503.33	500.31	5.58
188.05	273.67	243.58	242.18	241.85	242.68	206.10	503.48	500.29	5.62
188.55	273.56	243.56	242.19	241.85	242.69	208.33	503.45	500.15	5.64
189.05	273.69	243.54	242.16	241.85	242.69	210.68	503.39	500.11	5.63
189.55	273.74	243.52	242.15	241.85	242.67	212.54	503.36	500.08	5.64
190.04	273.84	243.58	242.15	241.83	242.70	213.98	503.12	499.91	5.66
190.55	274.28	243.47	242.13	241.81	242.67	215.38	502.86	499.78	5.62
191.05	274.24	243.49	242.11	241.80	242.67	216.38	502.90	499.98	5.57
191.55	274.56	243.33	241.93	241.64	242.50	219.17	501.33	500.00	5.57
192.04	274.90	243.34	242.00	241.69	242.59	219.02	502.04	500.11	5.59
192.54	274.91	243.28	242.05	241.74	242.62	220.00	502.28	500.14	5.62
193.04	275.20	243.35	242.03	241.74	242.64	220.68	502.16	500.17	5.60
193.55	275.00	243.37	242.06	241.77	242.58	221.23	502.35	500.17	5.62
194.04	275.07	243.37	242.04	241.77	242.65	221.93	502.39	500.23	5.63
194.55	274.83	243.37	242.06	241.75	242.67	222.55	502.42	500.25	5.66
195.05	274.76	243.38	242.06	241.79	242.68	223.03	502.51	500.27	5.61
195.54	274.72	243.40	242.07	241.78	242.68	223.50	502.70	500.27	5.58
196.05	274.41	243.41	242.07	241.80	242.69	224.05	502.69	500.23	5.57
196.55	274.21	243.41	242.10	241.80	242.69	224.91	502.66	500.01	5.62
197.05	273.97	243.44	242.08	241.79	242.71	226.14	502.84	499.99	5.61
197.55	273.83	243.42	242.10	241.81	242.71	227.05	502.84	499.98	5.60
198.05	273.52	243.46	242.11	241.81	242.69	228.19	502.91	499.97	5.60
198.55	273.48	243.38	242.02	241.71	242.54	231.95	501.85	499.98	5.64
199.04	273.39	243.38	242.02	241.73	242.65	234.17	502.22	500.08	5.65
199.55	273.57	243.43	242.09	241.78	242.73	235.64	502.72	500.18	5.59
200.05	273.85	243.41	242.08	241.78	242.73	236.67	502.59	500.15	5.57
200.54	274.10	243.43	242.10	241.81	242.73	237.19	502.76	500.31	5.58
201.05	274.49	243.42	242.10	241.81	242.76	237.26	502.68	500.17	5.62
201.55	274.56	243.42	242.08	241.79	242.72	237.31	502.35	499.89	5.62
202.05	274.74	243.37	242.04	241.75	242.70	237.34	502.07	499.85	5.63

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
202.55	275.05	243.34	242.00	241.75	242.68	237.40	501.98	499.80	5.63
203.04	274.99	243.33	242.02	241.73	242.66	237.41	501.77	499.67	5.66
203.55	275.08	243.29	241.98	241.71	242.66	237.45	501.73	499.59	5.60
204.05	274.93	243.30	242.00	241.71	242.68	237.50	501.74	499.89	5.57
204.55	274.88	243.30	242.03	241.74	242.71	237.49	501.95	500.07	5.60
205.05	274.84	243.35	242.04	241.77	242.72	237.58	502.17	500.16	5.64
205.54	274.49	243.37	242.06	241.79	242.78	237.76	502.46	500.32	5.61
206.04	274.27	243.29	241.95	241.68	242.63	239.13	501.47	500.17	5.63
206.55	274.40	243.35	242.02	241.75	242.72	239.31	502.31	500.27	5.64
207.05	274.14	243.38	242.07	241.78	242.77	240.04	502.49	500.41	5.65
207.55	273.82	243.45	242.12	241.83	242.80	240.29	502.91	500.48	5.60
208.04	273.76	243.45	242.12	241.83	242.80	240.36	503.07	500.54	5.57
208.55	273.74	243.48	242.15	241.85	242.82	240.45	502.98	500.40	5.59
209.04	273.56	243.40	242.11	241.83	242.80	240.56	503.00	500.18	5.63
209.55	273.54	243.53	242.11	241.82	242.79	240.68	502.79	500.15	5.62
210.05	273.66	243.44	242.09	241.82	242.81	240.75	502.76	500.01	5.63
210.54	274.00	243.42	242.09	241.80	242.79	240.80	502.75	500.02	5.64
211.05	274.16	243.42	242.09	241.80	242.79	240.92	502.58	499.97	5.67
211.55	274.41	243.38	242.05	241.78	242.78	241.01	502.40	499.90	5.61
212.04	274.70	243.36	242.03	241.76	242.75	241.06	502.07	499.74	5.58
212.55	274.68	243.26	241.92	241.67	242.67	241.13	501.43	499.93	5.60
213.05	275.00	243.32	242.01	241.74	242.76	241.40	502.04	500.12	5.63
213.55	275.21	243.31	242.04	241.75	242.85	241.61	502.23	500.30	5.62
214.05	275.28	243.29	242.00	241.75	242.75	241.66	501.96	500.30	5.62
214.55	275.17	243.33	242.02	241.77	242.75	241.70	502.22	500.38	5.63
215.04	274.95	243.33	242.03	241.75	242.79	241.73	502.33	500.38	5.67
215.55	274.84	243.31	242.03	241.76	242.79	241.75	502.20	500.31	5.60
216.04	274.59	243.36	242.05	241.78	242.80	241.76	502.29	500.31	5.57
216.55	274.41	243.37	242.05	241.78	242.78	241.78	502.44	500.24	5.59
217.05	274.15	243.37	242.06	241.79	242.80	241.78	502.43	500.27	5.63
217.55	274.06	243.48	242.06	241.79	242.83	241.81	502.56	500.42	5.62
218.04	273.66	243.64	242.09	241.81	242.88	241.82	502.78	500.38	5.61
218.54	273.59	243.85	242.09	241.82	242.77	241.84	502.82	500.34	5.63
219.05	273.55	244.24	242.09	241.82	242.84	241.86	502.93	500.25	5.66
219.55	273.31	245.05	242.11	241.85	242.84	241.87	502.83	500.20	5.62
220.05	273.44	247.95	242.10	241.83	242.84	241.87	502.72	500.08	5.58
220.54	273.67	250.87	241.96	241.69	242.73	241.80	501.99	500.09	5.58
221.04	274.05	251.80	242.03	241.76	242.78	241.90	502.15	500.23	5.62
221.54	274.37	252.05	242.04	241.79	242.85	241.94	502.41	500.29	5.62
222.05	274.82	252.10	242.04	241.79	242.81	241.95	502.31	500.25	5.62
222.55	275.00	252.17	242.04	241.77	242.79	241.95	502.14	500.08	5.62
223.05	275.01	252.22	242.02	241.75	242.77	241.97	502.05	499.99	5.65
223.54	275.30	252.13	241.98	241.73	242.75	241.95	501.69	499.79	5.64
224.04	275.13	252.17	241.96	241.71	242.73	241.94	501.64	499.86	5.57
224.55	275.08	252.20	241.98	241.71	242.75	241.96	501.58	499.84	5.57

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
225.05	275.13	252.13	241.98	241.71	242.75	241.98	501.71	499.81	5.59
225.55	275.05	252.22	241.97	241.70	242.74	241.97	501.93	499.90	5.62
226.04	274.80	252.27	241.99	241.72	242.76	242.01	501.90	499.96	5.61
226.55	274.60	252.32	242.01	241.74	242.80	242.02	502.10	499.97	5.61
227.04	274.10	252.46	241.93	241.70	242.74	241.90	501.62	500.07	5.63
227.55	274.15	252.44	242.04	241.75	242.83	242.06	502.36	500.37	5.65
228.05	273.71	252.58	242.06	241.77	242.81	242.09	502.35	500.46	5.60
228.54	273.75	252.64	242.07	241.79	242.82	242.09	502.43	499.95	5.58
229.05	273.67	252.67	242.05	241.80	242.82	242.10	502.65	500.08	5.58
229.54	273.40	252.70	242.07	241.80	242.84	242.12	502.38	500.04	5.62
230.05	273.65	252.74	242.07	241.80	242.84	242.14	502.36	500.08	5.62
230.55	273.88	252.50	242.03	241.78	242.82	242.14	502.28	499.96	5.63
231.05	274.15	252.59	242.04	241.76	242.80	242.13	502.05	499.81	5.64
231.55	274.46	252.52	242.03	241.76	242.74	242.13	501.99	499.87	5.65
232.05	274.71	252.43	242.02	241.77	242.83	242.19	502.27	500.47	5.62
232.55	274.89	252.41	242.06	241.81	242.85	242.24	502.40	500.51	5.59
233.04	274.99	252.41	242.07	241.80	242.84	242.23	502.27	500.34	5.57
233.55	275.35	252.33	242.04	241.78	242.84	242.22	502.33	500.21	5.61
234.05	275.19	252.35	241.93	241.69	242.73	242.05	501.49	500.29	5.62
234.55	275.37	252.24	242.03	241.76	242.84	242.19	502.12	500.37	5.62
235.05	275.09	252.26	242.01	241.74	242.80	242.21	501.82	500.35	5.62
235.55	274.93	252.33	242.08	241.79	242.82	242.31	502.49	500.70	5.63
236.04	274.66	252.41	242.08	241.83	242.91	242.33	502.68	500.69	5.65
236.54	274.35	252.48	242.08	241.81	242.87	242.31	502.34	500.26	5.57
237.05	274.04	252.52	242.04	241.77	242.85	242.28	502.30	500.15	5.56
237.55	273.88	252.50	242.04	241.77	242.83	242.27	502.21	500.13	5.56
238.05	273.70	252.61	242.06	241.79	242.86	242.29	502.41	500.32	5.60
238.54	273.61	252.51	242.06	241.79	242.85	242.34	502.38	500.14	5.61
239.04	273.51	252.57	242.07	241.80	242.83	242.34	502.52	500.27	5.61
239.54	273.48	252.60	242.07	241.82	242.86	242.36	502.39	499.55	5.63
240.05	273.69	252.49	242.00	241.73	242.79	242.30	501.67	499.34	5.63
240.55	273.69	252.47	241.91	241.64	242.71	242.18	500.92	499.88	5.65
241.05	274.45	252.31	242.01	241.74	242.84	242.32	502.07	500.20	5.59
241.54	274.57	252.40	242.07	241.80	242.84	242.41	502.38	500.25	5.57
242.04	274.53	252.39	241.99	241.72	242.78	242.35	501.65	499.62	5.58
242.55	274.84	252.34	241.99	241.74	242.82	242.40	502.02	500.13	5.63
243.05	275.05	252.30	242.01	241.74	242.81	242.42	501.94	500.15	5.61
243.55	275.10	252.27	242.00	241.75	242.78	242.42	501.89	500.09	5.62
244.04	275.14	252.21	241.97	241.73	242.79	242.40	501.56	499.91	5.62
244.55	275.16	252.26	241.98	241.71	242.79	242.41	501.79	499.89	5.65
245.04	274.90	252.33	241.98	241.73	242.81	242.43	501.57	499.92	5.61
245.55	274.85	252.37	241.98	241.73	242.81	242.43	501.86	500.01	5.56
246.05	274.39	252.44	242.02	241.77	242.82	242.45	501.80	500.07	5.57
246.54	274.25	252.47	242.01	241.74	242.82	242.46	501.96	500.10	5.58
247.05	273.90	252.52	242.03	241.78	242.84	242.50	502.30	500.25	5.60

Table B2. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
247.55	273.65	252.61	242.05	241.80	242.85	242.51	502.30	500.19	5.59
248.04	273.56	252.63	242.05	241.79	242.85	242.51	502.34	499.93	5.61
248.55	273.23	252.61	241.99	241.74	242.81	242.40	502.17	500.02	5.60
249.05	273.38	252.59	242.02	241.77	242.85	242.49	502.17	500.05	5.63
249.55	273.43	252.68	242.08	241.81	242.88	242.56	502.45	500.32	5.63
250.05	273.90	252.66	242.06	241.81	242.86	242.56	502.40	500.28	5.57
250.55	274.09	252.66	242.06	241.79	242.86	242.56	502.26	500.15	5.55
251.04	274.22	252.62	242.04	241.79	242.84	242.54	501.99	499.89	5.56
251.55	274.76	252.55	241.98	241.73	242.79	242.52	501.71	499.84	5.60
252.05	274.97	252.53	241.98	241.73	242.81	242.52	501.54	499.71	5.60
252.55	275.13	252.47	241.96	241.71	242.78	242.50	501.49	499.73	5.60
253.05	275.15	252.44	241.96	241.69	242.78	242.53	501.54	499.76	5.60
253.55	275.29	252.40	241.96	241.69	242.78	242.48	501.40	499.66	5.62
254.05	274.99	252.49	241.87	241.62	242.69	242.33	500.51	499.82	5.66
254.54	275.31	252.25	241.92	241.67	242.75	242.24	501.37	499.59	5.60
255.04	275.11	252.31	241.97	241.72	242.80	242.51	501.75	499.88	5.57
255.55	274.77	252.43	242.03	241.76	242.85	242.60	502.08	500.24	5.58
256.05	274.44	252.52	242.02	241.76	242.85	242.58	501.98	500.09	5.61
256.55	274.06	252.52	242.06	241.79	242.95	242.61	502.40	500.44	5.61

Table B3. Pressure and Temperature Data for Run 3.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
0.05	227.72	56.52	50.95	52.15	51.39	47.37	497.52	498.80	5.58
0.55	225.60	56.69	51.00	52.20	51.44	47.39	499.62	500.28	5.57
1.05	229.42	73.62	51.01	52.26	51.45	47.42	500.18	500.79	5.59
1.55	243.84	95.92	51.05	52.29	51.47	47.54	500.43	500.80	5.62
2.04	245.62	212.93	51.08	52.34	51.52	47.63	501.07	500.73	5.60
2.54	247.87	234.62	51.11	52.38	51.51	47.64	500.99	500.56	5.63
3.04	260.59	237.91	51.08	52.39	51.52	47.63	501.24	500.48	5.64
3.55	275.14	239.62	51.05	52.38	51.52	47.63	501.03	500.35	5.59
4.05	287.90	240.25	51.00	52.26	51.46	47.55	500.94	500.24	5.57
4.55	284.15	240.57	50.95	52.21	51.45	47.52	500.85	500.16	5.61
5.04	287.74	240.48	50.96	52.18	51.43	47.52	500.79	500.12	5.61
5.55	285.43	240.62	50.97	52.17	51.40	47.49	500.74	500.09	5.60
6.05	283.50	240.32	50.96	52.14	51.34	47.48	500.59	500.03	5.63
6.55	280.97	240.86	50.98	52.12	51.38	47.45	501.01	500.27	5.66
7.04	279.42	240.94	51.01	52.11	51.35	47.46	500.69	500.01	5.58
7.54	278.87	240.82	51.05	52.12	51.36	47.47	500.77	500.03	5.57
8.04	278.36	240.67	51.10	52.11	51.37	47.46	501.14	500.11	5.60
8.55	277.92	240.44	51.18	52.12	51.37	47.47	500.62	500.04	5.61
9.05	276.56	240.45	51.27	52.11	51.38	47.49	501.12	500.02	5.61
9.55	275.88	240.58	51.39	52.11	51.39	47.48	500.89	500.00	5.64
10.04	275.16	240.57	51.51	52.12	51.40	47.49	500.63	499.92	5.65
10.55	274.65	240.31	51.67	52.13	51.39	47.49	500.85	500.00	5.58
11.05	272.27	240.46	51.85	52.12	51.43	47.52	500.96	500.03	5.58
11.55	272.10	240.76	52.09	52.11	51.42	47.53	501.67	500.34	5.63
12.05	271.52	241.09	52.34	52.11	51.43	47.50	501.35	500.05	5.61
12.54	271.57	241.36	52.62	52.08	51.40	47.45	501.25	500.10	5.61
13.05	271.60	241.94	52.95	52.01	51.37	47.42	501.64	500.17	5.64
13.54	267.82	242.16	53.35	51.96	51.33	47.41	501.87	500.18	5.63
14.04	268.53	242.44	53.80	51.91	51.31	47.34	501.98	500.17	5.58
14.55	269.30	243.00	54.20	51.79	51.18	47.19	501.94	500.17	5.60
15.05	269.72	243.03	54.76	51.76	51.11	47.18	501.98	500.10	5.64
15.55	268.23	243.34	55.44	51.75	51.13	47.21	501.86	500.03	5.63
16.05	268.93	243.62	56.15	51.75	51.12	47.21	501.56	499.94	5.63
16.55	269.56	243.37	56.88	51.72	51.11	47.22	501.74	499.92	5.66
17.05	269.50	243.27	57.68	51.69	51.10	47.19	501.30	499.82	5.58
17.54	269.89	242.78	58.47	51.68	51.09	47.16	501.03	499.78	5.59
18.05	270.00	242.94	59.29	51.67	51.08	47.17	502.17	500.14	5.64
18.54	270.10	242.90	60.22	51.68	51.10	47.18	501.18	499.77	5.62
19.05	268.69	242.74	61.14	51.66	51.07	47.16	501.93	500.28	5.64
19.55	269.28	242.66	62.02	51.61	51.02	47.13	501.87	500.26	5.68
20.05	270.12	242.67	62.97	51.60	51.01	47.12	501.98	500.26	5.60
20.54	269.92	242.69	63.98	51.63	51.00	47.13	502.01	500.24	5.59
21.05	270.49	242.55	65.03	51.66	51.01	47.15	501.97	500.20	5.64
21.55	270.49	242.54	66.15	51.66	51.01	47.18	502.33	500.29	5.63
22.04	270.34	242.50	67.35	51.67	51.04	47.21	502.44	500.25	5.63

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
22.54	270.31	242.61	68.64	51.70	51.03	47.23	502.38	500.21	5.65
23.04	270.25	242.64	69.96	51.72	51.06	47.26	503.13	500.26	5.62
23.55	267.56	242.77	71.53	51.73	51.08	47.27	502.91	500.27	5.57
24.05	267.86	242.79	73.39	51.76	51.11	47.31	502.99	500.25	5.60
24.55	266.97	242.84	75.57	51.76	51.14	47.34	503.57	500.32	5.63
25.05	268.82	242.99	78.26	51.79	51.16	47.37	503.30	500.28	5.62
25.54	270.17	242.80	81.40	51.83	51.21	47.39	503.51	500.31	5.66
26.05	271.52	242.84	85.17	51.86	51.25	47.40	503.49	500.28	5.67
26.55	272.99	242.68	89.05	51.89	51.30	47.41	503.46	500.21	5.58
27.05	274.34	242.49	93.23	51.91	51.34	47.45	503.36	500.15	5.59
27.54	275.18	242.41	97.47	51.92	51.37	47.46	502.94	500.04	5.65
28.04	275.66	242.45	100.86	51.95	51.39	47.48	502.47	499.97	5.62
28.54	275.63	242.19	102.81	51.99	51.44	47.47	503.56	500.06	5.63
29.05	275.36	242.50	108.69	52.02	51.45	47.52	503.55	500.30	5.66
29.55	275.12	242.67	113.32	52.00	51.43	47.49	502.95	499.90	5.60
30.05	274.69	242.82	117.18	52.01	51.42	47.47	503.04	499.93	5.58
30.54	274.34	243.42	121.50	51.98	51.41	47.46	503.04	499.93	5.61
31.05	273.99	243.59	125.34	52.01	51.40	47.43	503.14	499.91	5.62
31.55	273.52	243.61	128.76	52.01	51.40	47.44	502.86	499.86	5.62
32.04	272.97	243.78	131.18	52.04	51.43	47.43	502.71	499.77	5.64
32.55	272.84	243.39	132.70	52.05	51.44	47.41	502.57	499.69	5.65
33.05	272.72	243.92	137.57	52.09	51.44	47.44	504.93	500.43	5.57
33.54	272.57	244.21	147.81	52.14	51.45	47.47	505.80	500.52	5.58
34.05	272.15	244.23	157.99	52.22	51.52	47.49	505.70	500.49	5.64
34.55	271.65	244.21	165.84	52.30	51.56	47.54	505.29	500.34	5.62
35.05	271.86	243.91	172.15	52.39	51.61	47.58	504.76	500.16	5.63
35.54	269.87	243.81	177.83	52.45	51.61	47.67	504.17	500.06	5.66
36.05	270.13	243.65	182.51	52.52	51.64	47.69	503.94	500.02	5.60
36.55	270.41	243.41	187.16	52.58	51.67	47.74	504.45	500.09	5.58
37.04	269.41	243.22	190.68	52.68	51.69	47.76	504.68	499.97	5.62
37.55	268.43	243.29	194.36	52.80	51.72	47.81	504.34	499.91	5.63
38.05	269.83	243.08	197.93	52.90	51.76	47.85	505.46	500.10	5.63
38.54	270.36	243.34	201.66	53.02	51.80	47.90	504.66	500.05	5.64
39.04	270.93	242.99	205.57	53.26	51.81	47.94	504.64	500.02	5.65
39.55	271.64	243.21	211.64	53.27	51.84	47.97	505.55	500.42	5.57
40.05	272.83	243.22	212.94	53.39	51.86	48.03	504.01	500.38	5.60
40.55	274.35	243.58	213.78	53.49	51.85	48.04	504.46	500.45	5.64
41.04	275.39	243.88	216.98	53.61	51.84	48.06	505.16	500.60	5.63
41.55	276.07	244.21	220.01	53.75	51.87	48.07	504.98	500.58	5.64
42.05	276.44	244.00	221.64	53.91	51.89	48.12	504.64	500.53	5.68
42.55	276.39	243.88	223.29	54.07	51.86	48.16	505.89	500.80	5.57
43.04	276.09	243.83	225.04	54.28	51.90	48.21	504.59	500.44	5.58
43.54	275.80	243.67	225.74	54.46	51.93	48.25	504.94	500.47	5.63
44.04	275.52	243.43	227.50	54.70	51.94	48.28	505.48	500.62	5.62
44.55	275.25	243.79	229.68	54.91	51.96	48.32	504.08	499.80	5.63

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
45.05	274.76	243.69	231.83	55.18	51.99	48.37	503.97	498.96	5.66
45.55	274.41	243.36	231.64	55.44	51.98	48.39	504.57	500.85	5.61
46.05	273.98	243.40	232.10	55.67	52.02	48.44	504.95	500.67	5.58
46.55	273.74	243.05	233.34	55.95	52.03	48.44	505.10	500.70	5.61
47.05	273.55	243.11	234.29	56.24	52.04	48.49	505.74	500.83	5.63
47.55	273.23	242.99	235.84	56.58	52.06	48.54	507.63	501.10	5.62
48.05	272.86	243.50	237.91	56.95	52.07	48.56	506.73	500.91	5.66
48.54	272.57	243.58	238.47	57.32	52.07	48.60	506.67	500.83	5.64
49.05	272.34	243.65	239.07	57.69	52.08	48.61	506.81	500.88	5.58
49.54	271.79	243.93	239.52	58.07	52.07	48.64	506.50	500.79	5.60
50.05	271.55	243.90	239.85	58.52	52.07	48.68	506.00	500.66	5.64
50.55	271.46	243.76	239.93	58.96	52.08	48.69	505.30	500.48	5.64
51.05	269.72	243.79	240.18	59.40	52.07	48.73	506.30	500.71	5.65
51.55	269.86	243.87	240.53	59.90	52.11	48.78	502.51	499.98	5.66
52.05	270.05	243.26	240.39	60.38	52.14	48.80	502.49	499.82	5.57
52.55	270.23	243.30	240.44	60.75	52.14	48.85	504.12	500.57	5.60
53.05	270.93	243.33	240.46	61.11	52.15	48.87	504.40	500.54	5.65
53.55	272.11	243.35	240.37	61.54	52.18	48.90	504.93	500.80	5.63
54.05	273.56	243.23	240.52	62.05	52.18	48.90	504.89	500.76	5.64
54.55	274.77	242.99	240.66	62.59	52.21	48.95	504.99	500.68	5.69
55.04	275.74	243.15	240.89	63.11	52.23	48.97	505.07	500.76	5.60
55.55	276.36	243.05	241.06	63.64	52.26	49.02	505.82	500.54	5.60
56.05	276.64	243.31	241.80	64.22	52.28	49.02	507.21	501.44	5.65
56.54	276.86	243.35	241.79	64.73	52.29	49.07	506.24	501.07	5.64
57.05	276.27	243.35	241.65	65.30	52.31	49.09	505.58	500.89	5.65
57.55	276.26	243.27	241.53	65.89	52.30	49.10	505.27	500.75	5.67
58.05	275.51	243.19	241.36	66.51	52.32	49.14	504.89	500.59	5.59
58.55	275.16	243.30	241.56	67.17	52.41	49.17	502.44	498.05	5.60
59.04	274.99	242.87	241.58	67.80	52.36	49.21	502.05	497.76	5.64
59.55	274.67	243.01	241.75	68.39	52.38	49.24	503.76	499.72	5.64
60.04	274.35	243.33	241.92	68.98	52.41	49.24	505.63	500.74	5.64
60.55	273.92	243.55	242.08	69.61	52.41	49.25	506.91	501.45	5.68
61.05	273.50	243.52	242.12	70.37	52.44	49.29	505.31	499.71	5.59
61.54	273.22	243.48	242.02	71.11	52.46	49.30	504.66	499.14	5.58
62.05	272.95	243.34	242.06	71.89	52.50	49.34	504.77	499.34	5.62
62.55	272.85	243.29	242.03	72.66	52.53	49.35	504.51	499.06	5.62
63.05	272.50	243.22	242.07	73.44	52.46	49.39	504.48	499.16	5.63
63.55	271.91	243.17	242.13	74.25	52.60	49.78	505.36	499.40	5.65
64.04	271.10	243.54	242.30	75.09	52.20	49.44	506.21	499.82	5.61
64.55	268.89	243.52	242.32	75.95	52.70	49.46	506.02	499.75	5.56
65.05	269.44	243.69	242.33	76.82	52.75	49.49	505.86	499.75	5.60
65.55	270.60	243.68	242.21	77.77	52.79	49.51	503.41	498.10	5.63
66.04	271.62	243.38	242.04	78.75	52.84	49.54	502.51	498.41	5.63
66.54	272.10	243.42	242.15	79.67	52.86	49.54	504.46	500.32	5.66
67.04	272.66	243.39	242.30	80.63	52.90	49.57	505.92	499.89	5.67

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
67.55	273.75	243.57	242.39	81.71	52.95	49.57	506.36	500.00	5.58
68.05	274.97	243.65	242.50	82.89	53.03	49.50	507.62	500.03	5.59
68.55	276.00	243.62	242.53	84.17	53.11	49.64	507.25	500.00	5.65
69.05	276.28	243.64	242.48	85.54	53.15	49.67	506.68	499.90	5.63
69.55	276.94	243.86	242.39	87.33	53.25	49.67	506.04	499.77	5.66
70.05	276.74	243.54	242.36	88.44	53.30	49.70	505.72	499.92	5.67
70.55	276.70	243.50	242.31	89.88	53.38	49.70	505.68	499.89	5.60
71.04	276.81	243.55	242.37	91.37	53.48	49.73	506.19	499.89	5.61
71.54	275.95	243.45	242.43	93.02	53.60	49.77	506.22	500.37	5.64
72.04	275.49	243.46	242.38	94.58	53.70	49.79	506.00	500.21	5.63
72.55	274.88	243.42	242.40	96.31	53.78	49.80	506.75	500.38	5.67
73.05	274.54	243.59	242.53	98.19	53.88	49.84	507.27	500.43	5.65
73.55	274.37	243.85	242.54	100.24	53.94	49.85	507.27	500.34	5.59
74.05	274.14	243.74	242.51	102.39	54.06	49.85	506.93	500.24	5.63
74.54	273.89	243.80	242.48	104.62	54.16	49.87	506.57	500.18	5.65
75.05	273.47	243.45	242.43	106.82	54.30	49.88	506.12	500.10	5.66
75.55	273.08	243.74	242.45	109.02	54.42	49.90	506.71	500.12	5.67
76.05	272.78	243.73	242.49	111.26	54.55	49.93	506.92	500.13	5.63
76.54	272.51	243.50	242.50	113.97	54.67	49.95	506.80	500.09	5.59
77.04	271.99	243.48	242.59	116.14	54.83	49.97	508.03	500.22	5.61
77.55	271.68	243.54	242.63	118.86	54.95	50.00	508.06	500.18	5.63
78.04	270.35	243.67	242.65	121.85	55.10	50.02	508.07	500.08	5.65
78.55	269.96	243.84	242.64	125.06	55.22	50.05	507.88	500.04	5.68
79.05	270.32	243.81	242.59	128.34	55.38	50.05	507.64	499.99	5.61
79.54	271.03	243.85	242.48	131.74	55.54	50.06	506.52	500.21	5.58
80.05	271.88	243.73	242.45	134.77	55.69	50.08	506.49	493.11	5.60
80.55	273.04	243.69	242.49	137.83	55.87	50.08	507.01	500.61	5.63
81.05	274.30	243.70	242.59	140.71	56.01	50.09	507.82	500.53	5.63
81.54	275.60	243.68	242.68	143.69	56.20	50.13	508.56	500.36	5.67
82.04	276.45	243.67	242.81	146.96	56.38	50.15	510.04	500.46	5.65
82.54	276.82	243.85	242.89	150.93	56.59	50.16	510.10	500.52	5.59
83.05	277.11	243.81	242.82	155.46	56.76	50.20	509.56	500.39	5.62
83.55	276.85	243.81	242.75	160.10	56.96	50.21	508.85	500.24	5.64
84.05	276.84	243.85	242.72	164.24	57.13	50.21	508.46	500.17	5.63
84.54	276.14	243.73	242.72	167.83	57.33	50.21	508.74	500.19	5.67
85.05	275.96	243.82	242.78	171.32	57.52	50.50	509.42	500.23	5.64
85.55	275.56	243.84	242.86	174.99	57.69	50.26	510.25	500.30	5.57
86.05	275.26	243.88	242.90	178.93	57.89	50.28	510.36	500.32	5.62
86.54	275.01	243.98	242.83	183.44	58.08	50.31	509.43	500.50	5.64
87.05	274.53	244.03	242.72	187.70	58.31	50.31	508.40	500.42	5.65
87.54	274.40	243.77	242.64	190.73	58.57	50.33	507.95	499.88	5.67
88.05	274.01	243.93	242.62	192.81	58.80	50.36	508.04	500.05	5.63
88.55	273.55	243.83	242.68	194.68	59.05	50.38	508.51	500.05	5.57
89.05	273.14	243.83	242.74	196.92	59.20	50.38	509.01	500.07	5.61
89.55	272.91	243.75	242.85	199.09	59.70	50.43	510.30	500.13	5.62

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
90.05	272.81	243.89	242.96	202.46	59.93	50.47	510.91	500.15	5.62
90.55	272.80	244.04	242.95	205.42	60.26	50.49	510.84	500.11	5.65
91.04	270.96	244.26	242.91	207.69	60.60	50.49	510.52	500.04	5.66
91.54	271.19	244.15	242.84	209.77	60.98	50.51	510.03	499.99	5.57
92.05	269.55	243.87	242.81	211.67	61.38	50.54	509.64	499.94	5.57
92.54	269.70	243.95	242.74	213.06	61.81	50.58	509.24	499.90	5.64
93.05	271.22	243.95	242.75	214.62	62.22	50.58	509.31	499.90	5.61
93.55	272.47	243.99	242.79	216.28	62.66	50.64	509.32	499.88	5.62
94.05	273.81	243.79	242.70	217.79	63.24	50.67	508.85	499.60	5.67
94.55	274.85	243.83	242.79	220.25	63.65	51.01	510.04	499.85	5.61
95.04	276.10	243.76	242.87	221.99	64.15	50.73	510.38	500.03	5.59
95.55	276.57	243.88	242.91	223.13	64.70	50.75	510.57	500.03	5.66
96.04	277.03	244.20	242.87	224.17	65.27	50.78	510.25	500.02	5.65
96.55	277.05	244.08	242.84	224.98	65.88	50.84	510.04	499.96	5.64
97.05	276.86	243.96	242.83	226.38	66.47	50.88	509.79	499.92	5.68
97.54	276.21	243.98	242.83	226.76	67.09	50.92	510.11	499.95	5.60
98.05	275.97	243.96	242.83	227.95	67.76	50.96	510.02	499.91	5.59
98.55	275.97	243.84	243.21	228.95	68.42	51.00	509.49	499.85	5.63
99.05	275.67	243.84	243.04	229.33	69.12	51.23	510.10	500.00	5.63
99.54	275.24	243.94	242.95	230.64	69.86	51.08	510.89	500.04	5.64
100.04	274.99	244.19	242.97	231.79	70.64	51.13	511.15	500.03	5.67
100.55	274.51	244.30	242.96	232.96	71.45	51.18	510.98	499.99	5.61
101.04	274.16	244.14	242.87	234.54	72.37	51.23	509.92	500.22	5.59
101.55	273.86	244.00	242.80	234.97	73.24	51.25	509.56	500.06	5.64
102.05	273.35	243.93	242.80	235.38	74.11	51.31	509.84	500.04	5.62
102.54	273.07	243.97	242.82	235.73	75.00	51.35	509.75	500.03	5.63
103.05	272.95	243.99	242.84	235.96	75.96	51.39	509.89	500.03	5.67
103.55	271.58	243.78	242.85	236.23	76.92	51.45	510.03	500.03	5.60
104.05	270.63	243.87	243.30	236.92	77.95	51.49	511.30	500.08	5.58
104.55	271.25	243.93	243.03	237.85	79.08	51.55	511.69	500.13	5.62
105.04	271.13	244.09	243.04	238.38	80.30	51.59	511.59	500.12	5.63
105.55	271.59	244.11	243.00	239.02	81.52	51.63	511.23	500.03	5.63
106.04	272.19	244.19	242.97	239.44	82.79	51.65	510.91	499.98	5.64
106.55	273.38	244.10	242.92	239.67	84.11	51.73	510.46	499.97	5.64
107.05	274.96	244.34	242.88	239.66	85.40	51.77	510.31	499.95	5.57
107.55	276.05	244.18	242.87	239.88	86.78	51.86	510.27	500.14	5.61
108.05	276.63	243.95	242.85	240.33	88.24	51.90	509.71	500.27	5.63
108.55	276.33	244.09	242.86	240.74	89.66	51.71	510.15	500.15	5.63
109.05	276.26	243.85	242.97	240.87	91.14	52.05	511.17	500.23	5.65
109.55	276.25	243.97	243.02	241.09	92.68	52.11	511.66	500.20	5.66
110.04	276.13	244.16	243.02	241.20	94.32	52.19	511.50	500.17	5.58
110.54	275.93	244.30	243.01	241.24	95.98	52.27	511.20	500.13	5.60
111.04	275.81	244.29	242.96	241.24	97.69	52.37	510.93	500.09	5.64
111.55	275.80	244.20	242.93	241.26	99.40	52.45	510.52	500.07	5.61
112.05	275.73	244.11	242.93	241.35	101.14	52.57	510.59	500.04	5.62

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
112.55	275.45	244.04	242.93	241.44	102.88	52.68	510.66	500.06	5.67
113.04	274.89	243.85	242.93	241.57	104.72	52.78	510.64	500.01	5.59
113.55	274.52	243.58	242.99	241.73	106.58	52.89	511.55	500.11	5.60
114.05	274.23	244.28	243.13	241.99	108.51	53.03	512.39	500.20	5.66
114.55	273.72	244.05	243.12	242.01	110.61	53.13	511.93	500.24	5.64
115.05	273.40	244.34	243.03	242.01	112.73	53.26	511.35	499.42	5.64
115.54	273.36	244.29	243.00	241.99	114.89	53.42	511.00	500.11	5.69
116.04	271.55	244.16	242.96	241.96	116.98	53.53	510.79	500.04	5.59
116.55	271.55	244.11	242.91	241.94	119.10	53.67	510.52	499.99	5.59
117.05	271.54	244.03	242.97	241.96	121.17	53.81	510.84	500.03	5.64
117.55	271.22	243.99	242.97	242.00	123.22	53.98	510.89	500.04	5.62
118.04	271.48	244.42	242.97	242.02	125.52	54.12	510.97	500.00	5.63
118.55	272.06	243.93	243.05	242.35	127.29	54.29	512.11	500.06	5.67
119.05	273.13	243.96	243.18	242.31	129.58	54.46	512.91	500.12	5.60
119.55	274.54	244.16	243.21	242.30	131.46	54.64	513.12	500.10	5.59
120.04	275.50	244.36	243.21	242.30	133.61	54.83	513.03	500.08	5.63
120.54	276.10	244.38	243.20	242.28	135.76	55.04	512.83	500.03	5.62
121.04	276.11	244.33	243.16	242.27	137.90	55.25	512.50	499.99	5.63
121.55	276.16	244.24	243.11	242.23	140.02	55.48	512.32	499.98	5.67
122.05	276.48	244.42	243.11	242.22	142.13	55.73	511.78	499.97	5.61
122.55	276.86	244.12	242.83	242.20	144.26	55.98	511.52	500.06	5.58
123.05	276.83	243.94	243.03	241.88	146.31	56.23	511.62	500.02	5.61
123.55	276.51	244.00	243.30	242.33	148.43	56.74	512.61	500.13	5.62
124.05	276.17	244.09	243.18	242.35	150.59	56.80	512.60	500.13	5.62
124.55	275.88	244.33	243.16	242.35	152.78	57.09	512.38	500.12	5.64
125.04	275.42	244.35	243.11	242.32	155.01	57.39	511.94	500.11	5.65
125.55	274.83	244.37	243.07	242.27	157.23	57.74	511.34	500.05	5.56
126.04	274.60	244.42	243.02	242.22	159.38	58.06	510.70	499.98	5.59
126.54	274.30	244.17	243.01	242.22	161.46	58.44	510.63	500.01	5.63
127.05	273.83	244.01	243.01	242.20	163.46	58.79	510.38	499.97	5.62
127.55	273.40	243.89	242.96	242.15	165.47	59.45	509.75	500.17	5.63
128.05	273.19	243.93	242.98	242.17	167.40	59.57	510.33	500.13	5.66
128.54	272.87	243.82	243.05	242.26	169.32	59.95	510.71	500.09	5.58
129.05	272.02	243.97	243.02	242.24	171.29	60.35	510.37	500.21	5.58
129.55	271.90	244.08	242.98	242.18	173.21	60.79	509.93	500.05	5.64
130.05	271.93	243.95	242.91	242.12	175.05	61.22	509.51	499.97	5.63
130.54	271.82	244.04	242.88	242.09	176.81	61.66	509.16	499.95	5.64
131.04	272.47	243.81	242.86	242.05	178.48	62.10	509.14	499.94	5.68
131.54	273.58	243.94	242.86	242.06	180.12	62.57	508.78	499.96	5.60
132.05	275.10	243.85	242.85	242.06	181.65	63.05	508.73	499.91	5.59
132.55	275.88	243.42	242.87	242.08	183.10	63.52	509.10	499.95	5.65
133.05	276.66	243.94	242.94	242.15	184.52	64.04	509.96	500.04	5.62
133.54	277.20	243.87	242.98	242.19	186.06	64.57	510.01	500.09	5.64
134.05	277.50	243.96	242.94	242.17	187.75	65.15	509.74	500.05	5.67
134.55	276.80	244.15	242.87	242.07	189.58	65.78	508.76	500.27	5.60

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
135.05	276.35	244.09	242.78	242.00	191.47	66.40	508.25	499.92	5.60
135.54	276.16	243.90	242.73	241.93	193.08	67.01	507.72	500.08	5.64
136.04	275.87	244.06	242.71	241.93	194.48	67.61	507.73	500.08	5.62
136.54	275.68	243.84	242.72	241.93	195.73	68.18	507.79	500.01	5.64
137.05	275.63	243.67	242.73	241.95	196.97	68.71	508.03	500.02	5.68
137.55	275.68	243.81	242.84	241.63	198.23	69.52	509.19	500.12	5.60
138.05	275.51	243.72	242.92	242.13	199.75	70.15	509.46	500.08	5.59
138.54	275.24	243.87	242.92	242.09	201.49	70.92	509.33	500.09	5.64
139.05	274.76	244.08	242.86	242.06	203.33	71.71	508.94	500.03	5.63
139.55	274.18	243.83	242.81	242.01	205.12	72.48	508.52	499.95	5.64
140.05	273.95	243.73	242.76	241.97	206.65	73.26	508.10	499.89	5.66
140.54	273.70	243.93	242.73	241.92	207.78	74.03	507.99	499.81	5.61
141.05	273.47	243.71	242.69	241.88	208.96	74.82	507.73	499.78	5.57
141.54	272.81	243.43	242.64	241.83	210.43	75.63	507.03	499.75	5.62
142.05	272.40	243.59	242.58	241.81	211.91	76.49	507.26	500.04	5.62
142.55	271.66	243.64	242.69	241.91	213.45	77.32	508.17	500.08	5.64
143.05	271.61	243.70	242.71	241.93	215.14	78.22	508.05	500.09	5.67
143.55	271.90	243.81	242.68	241.89	216.68	79.14	507.84	500.01	5.61
144.05	273.26	243.66	242.62	241.82	217.95	80.12	507.44	499.97	5.58
144.55	274.36	243.76	242.59	241.82	218.93	81.09	507.13	499.94	5.63
145.05	275.49	243.65	242.55	241.77	219.76	82.06	506.74	499.88	5.64
145.55	276.47	243.68	242.52	241.77	220.46	83.04	506.67	499.91	5.63
146.04	277.14	243.69	242.52	241.75	221.22	84.03	506.68	499.94	5.68
146.54	277.43	243.51	242.52	241.75	222.19	85.02	506.55	499.77	5.62
147.05	277.63	243.42	242.57	241.80	223.23	86.07	507.32	499.92	5.59
147.54	276.82	243.53	242.59	241.84	224.70	87.15	507.33	499.87	5.65
148.05	276.30	243.60	242.60	241.81	225.99	88.31	507.00	499.82	5.63
148.55	276.05	243.58	242.51	241.68	227.85	89.50	505.68	500.17	5.64
149.04	275.79	243.82	242.36	241.58	229.75	90.68	505.07	499.88	5.67
149.55	275.63	243.85	242.31	241.54	230.54	91.76	504.67	500.00	5.59
150.05	275.67	243.57	242.31	241.52	230.68	92.78	504.62	500.00	5.59
150.55	275.58	243.30	242.31	241.56	230.70	93.75	504.80	499.99	5.64
151.04	275.44	243.33	242.35	241.58	231.06	94.75	505.10	500.03	5.63
151.54	275.08	243.28	242.40	241.65	231.62	95.85	505.81	500.09	5.63
152.04	274.51	243.39	242.51	241.78	232.37	97.08	506.82	500.14	5.69
152.54	274.17	243.48	242.57	241.81	233.11	98.43	506.88	500.14	5.61
153.05	273.56	243.48	242.53	241.80	234.07	99.90	506.57	500.08	5.62
153.55	273.11	243.54	242.50	241.74	235.06	101.38	506.03	499.99	5.66
154.04	272.72	243.66	242.44	241.69	235.47	102.85	505.61	499.92	5.64
154.55	271.96	243.68	242.39	241.64	235.62	104.25	505.16	499.75	5.66
155.05	271.86	243.67	242.37	241.64	236.01	105.64	505.14	500.04	5.67
155.55	271.54	243.36	242.30	241.57	237.21	107.08	504.34	500.19	5.58
156.04	271.18	243.24	242.23	241.50	238.09	108.45	503.71	500.17	5.61
156.54	272.21	243.24	242.29	241.59	238.42	109.74	504.79	500.22	5.64
157.04	273.53	243.20	242.36	241.68	238.42	111.36	505.21	500.27	5.62

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
157.55	274.82	243.47	242.36	241.70	238.83	112.58	505.27	500.22	5.64
158.05	275.96	243.45	242.36	241.68	238.90	114.16	505.11	500.19	5.67
158.55	276.88	243.63	242.36	241.66	238.94	115.80	504.89	500.15	5.58
159.05	277.43	243.56	242.31	241.65	239.05	117.42	504.57	500.08	5.60
159.55	277.70	243.26	242.27	241.61	239.07	118.99	504.48	500.02	5.65
160.05	277.76	243.31	242.27	241.61	239.16	120.54	504.42	500.03	5.62
160.55	277.49	243.37	242.51	241.61	239.19	122.08	504.39	500.04	5.64
161.04	277.12	243.21	242.35	241.69	239.46	123.63	505.05	500.19	5.66
161.55	276.49	243.23	242.40	241.76	239.84	125.30	505.50	500.25	5.59
162.04	275.92	243.39	242.39	241.76	240.31	127.07	505.13	500.18	5.58
162.55	275.70	243.68	242.33	241.69	240.58	128.83	504.50	496.43	5.64
163.05	275.60	243.84	242.14	241.49	241.15	130.67	502.88	500.08	5.63
163.55	275.48	243.91	242.08	241.49	241.26	132.08	502.91	500.07	5.63
164.05	275.17	244.68	242.10	241.51	241.26	133.39	503.00	500.00	5.66
164.54	274.96	244.63	242.12	241.53	241.21	134.65	503.20	500.11	5.61
165.05	274.68	244.38	242.19	241.60	241.22	135.96	503.72	500.19	5.60
165.55	274.34	244.18	242.19	241.62	241.21	137.44	503.86	500.18	5.64
166.04	273.65	244.11	242.21	241.64	241.17	139.00	503.91	500.19	5.63
166.55	273.21	244.04	242.23	241.66	241.17	140.60	504.03	500.18	5.63
167.04	272.89	244.04	242.23	241.69	241.19	142.26	504.11	500.19	5.65
167.54	272.49	243.79	242.21	241.68	241.23	143.93	503.84	500.11	5.61
168.05	272.05	243.92	242.21	241.68	241.27	145.56	503.75	500.07	5.57
168.55	271.76	243.67	242.20	241.70	241.14	147.18	503.80	500.07	5.61
169.05	271.28	243.22	242.25	241.73	241.37	148.75	504.17	500.17	5.63
169.54	272.06	243.47	242.09	241.59	241.70	150.49	502.57	500.11	5.63
170.05	273.42	243.29	242.02	241.57	241.63	151.89	502.36	500.07	5.64
170.55	275.10	243.65	242.06	241.59	241.88	152.99	502.53	500.03	5.63
171.05	276.54	243.83	242.06	241.61	241.90	154.11	502.67	500.11	5.57
171.54	277.16	243.89	242.06	241.61	241.92	155.21	502.79	500.14	5.61
172.04	277.33	243.49	242.06	241.63	241.92	156.37	502.78	500.14	5.64
172.54	277.48	243.94	242.10	241.67	241.95	157.65	503.26	500.22	5.62
173.05	277.55	243.71	242.13	241.70	241.97	159.08	503.26	500.21	5.67
173.55	277.47	243.71	242.11	241.72	241.99	160.60	503.28	500.18	5.66
174.05	276.80	243.69	242.13	241.72	241.99	162.17	503.04	500.06	5.59
174.54	276.43	243.48	241.94	241.72	241.96	163.79	503.03	500.09	5.61
175.05	276.18	243.26	242.15	241.76	242.01	165.38	503.43	500.17	5.65
175.55	275.88	244.04	242.21	241.83	242.06	167.16	503.78	500.25	5.63
176.05	275.72	244.05	242.17	241.81	242.06	169.09	503.54	500.11	5.64
176.54	275.72	243.64	241.96	241.58	241.90	171.27	501.52	499.94	5.64
177.05	275.67	243.48	242.01	241.65	242.01	172.91	502.10	500.04	5.58
177.54	275.64	243.79	242.01	241.67	242.01	174.25	502.00	499.99	5.62
178.05	274.94	243.70	242.01	241.67	242.05	175.28	502.07	500.02	5.65
178.55	274.13	243.47	242.05	241.73	242.10	176.16	502.50	500.11	5.65
179.05	273.79	243.68	242.08	241.76	242.12	177.22	502.53	500.15	5.66
179.55	273.40	243.55	242.12	241.78	242.16	178.49	502.87	500.23	5.62

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
180.05	273.23	243.63	242.16	241.85	242.21	180.24	503.51	500.38	5.59
180.55	272.24	243.56	242.21	241.91	242.52	182.45	503.59	499.93	5.62
181.04	271.66	243.68	242.18	241.86	242.21	185.71	503.20	499.93	5.63
181.54	271.32	243.88	242.12	241.80	242.18	189.21	502.79	499.90	5.64
182.05	271.64	243.56	242.09	241.77	242.14	192.17	502.49	499.74	5.67
182.54	272.72	243.40	242.05	241.75	242.14	194.39	502.25	499.99	5.62
183.04	273.88	243.74	242.06	241.77	242.16	195.74	502.39	500.01	5.58
183.54	275.06	243.45	241.97	241.64	242.06	197.13	501.30	500.17	5.63
184.05	276.03	243.20	242.04	241.30	242.16	197.49	502.31	500.32	5.64
184.55	276.89	243.24	242.13	241.73	242.25	197.46	502.95	500.41	5.65
185.04	277.70	243.53	242.13	241.82	242.31	198.80	502.84	500.40	5.68
185.55	278.09	243.49	242.15	241.86	242.29	200.52	503.03	500.42	5.61
186.05	277.95	244.07	242.15	241.84	242.29	203.12	502.93	500.43	5.59
186.54	277.68	243.58	242.11	241.84	242.27	206.21	502.71	500.30	5.63
187.04	277.23	243.66	242.10	241.81	242.26	208.97	502.48	500.16	5.62
187.54	276.73	243.55	242.08	241.79	242.26	210.92	502.44	500.10	5.64
188.04	276.25	243.57	242.10	241.79	242.26	212.36	502.46	500.17	5.69
188.55	275.80	243.33	241.74	241.83	242.29	213.86	502.60	500.21	5.60
189.05	275.72	243.80	242.13	241.88	242.35	215.69	503.18	500.39	5.58
189.55	275.77	243.51	242.19	241.90	242.39	219.35	503.27	500.44	5.65
190.04	275.87	243.55	242.15	241.86	242.35	223.06	502.92	500.18	5.63
190.55	275.35	243.93	241.94	241.67	242.17	224.92	501.46	500.08	5.65
191.05	274.72	243.52	242.01	241.76	242.26	221.58	502.12	500.22	5.68
191.55	274.22	243.53	242.05	241.80	242.28	220.73	502.28	500.24	5.60
192.04	273.58	243.66	242.05	241.76	242.26	224.17	501.92	500.15	5.61
192.54	273.18	243.47	242.03	241.78	242.30	225.89	502.06	500.23	5.65
193.05	272.59	243.32	242.07	241.80	242.61	226.82	502.34	500.32	5.63
193.54	272.43	243.36	242.10	241.87	242.37	228.56	502.94	500.51	5.66
194.05	271.66	243.81	242.16	241.91	242.43	230.87	503.15	500.50	5.67
194.55	271.32	243.68	242.16	241.87	242.38	232.50	502.85	500.32	5.60
195.05	272.12	243.61	242.09	241.82	242.36	233.70	502.38	500.01	5.64
195.55	273.33	243.83	242.03	241.80	242.32	233.88	502.07	499.83	5.66
196.04	274.44	243.58	242.00	241.77	242.31	233.95	501.85	499.74	5.66
196.55	275.47	243.52	242.02	241.77	242.31	234.04	501.92	499.83	5.69
197.05	276.32	243.26	242.04	241.79	242.49	234.33	502.12	499.93	5.61
197.55	276.91	243.45	241.98	241.71	242.25	235.77	501.09	499.80	5.62
198.05	277.25	243.60	241.98	241.75	242.63	235.39	501.99	500.14	5.66
198.55	277.49	243.53	242.08	241.84	242.40	236.59	502.50	500.37	5.65
199.05	277.64	243.60	242.06	241.81	242.40	239.03	502.21	500.19	5.68
199.55	277.48	243.55	242.06	241.81	242.40	239.68	502.17	500.23	5.65
200.05	276.69	243.49	242.04	241.77	242.38	239.80	502.10	500.24	5.61
200.54	276.21	243.58	242.04	241.77	242.38	239.84	502.01	500.20	5.65
201.05	275.96	243.41	242.06	241.81	242.42	239.86	502.28	500.33	5.64
201.54	275.82	243.58	242.08	241.83	242.44	239.98	502.40	500.34	5.66
202.05	275.79	243.46	242.21	241.83	242.46	240.16	502.40	500.30	5.68

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
202.55	275.66	243.44	242.42	241.88	242.49	240.38	502.98	500.52	5.59
203.04	275.49	243.30	242.14	241.88	242.53	240.68	502.79	500.36	5.61
203.55	275.19	243.37	242.10	241.85	242.49	240.90	502.40	500.07	5.65
204.05	274.70	243.79	242.05	241.79	242.48	240.99	502.08	499.87	5.65
204.54	274.29	243.70	241.89	241.65	242.33	240.15	501.10	499.93	5.67
205.05	273.74	243.43	241.99	241.74	242.42	239.32	501.84	500.04	5.65
205.54	273.34	243.43	241.99	241.74	242.44	240.77	501.67	499.90	5.61
206.05	272.52	243.39	241.99	241.74	242.44	241.28	501.48	499.77	5.64
206.55	271.91	243.54	242.01	241.78	242.50	241.40	502.08	500.27	5.64
207.04	271.41	243.88	242.10	241.83	242.57	241.51	502.72	500.56	5.66
207.55	271.74	243.68	242.10	241.85	242.59	241.62	502.50	500.41	5.69
208.04	272.82	243.45	242.07	241.84	242.55	241.62	502.22	500.13	5.61
208.55	274.52	243.34	242.03	241.80	242.54	241.62	501.93	499.91	5.61
209.05	275.38	243.36	242.00	241.77	242.50	241.60	501.70	499.86	5.66
209.55	276.30	243.38	241.98	241.75	242.50	241.60	501.50	499.71	5.65
210.04	276.90	243.72	241.98	241.75	242.52	241.62	501.68	499.83	5.67
210.54	277.27	243.24	242.00	241.77	242.54	241.64	501.79	499.92	5.63
211.04	277.43	243.44	242.04	241.79	242.56	241.64	502.10	500.06	5.59
211.55	277.47	243.33	241.97	241.73	242.50	241.64	501.73	499.99	5.63
212.05	277.42	243.49	242.04	241.82	242.61	241.77	502.22	500.39	5.63
212.55	277.26	243.54	242.06	241.82	242.61	241.82	502.15	500.29	5.64
213.04	276.65	243.64	241.95	241.70	242.49	241.72	500.92	498.88	5.68
213.55	276.19	243.64	241.93	241.70	242.51	241.74	501.26	499.96	5.62
214.05	275.87	243.51	241.97	241.74	242.54	241.76	501.53	500.06	5.59
214.55	275.71	243.28	242.02	241.77	242.60	241.83	501.96	500.30	5.63
215.05	275.48	243.44	242.04	241.56	242.53	241.86	502.25	500.46	5.63
215.55	275.39	243.41	242.08	241.85	242.67	241.88	502.54	500.52	5.63
216.05	275.14	243.44	242.31	241.94	242.71	241.92	502.64	500.48	5.64
216.54	274.93	243.46	242.08	241.83	242.65	241.87	502.17	500.05	5.61
217.05	273.93	243.61	242.01	241.80	242.62	241.83	501.70	499.78	5.57
217.55	273.28	243.71	241.98	241.76	242.58	241.80	501.47	499.61	5.61
218.05	273.10	243.37	241.98	241.76	242.60	241.81	501.54	499.88	5.63
218.54	272.39	243.61	241.90	241.69	242.55	241.08	501.52	499.98	5.63
219.05	271.78	243.46	242.03	241.80	242.64	241.53	502.02	500.09	5.65
219.55	271.65	243.54	242.05	241.83	242.68	241.89	502.24	500.45	5.62
220.05	271.77	243.43	241.91	241.67	242.55	241.82	500.98	499.02	5.58
220.55	273.03	243.27	242.32	241.49	242.62	241.91	501.76	500.10	5.61
221.04	274.05	243.41	242.07	241.85	242.70	242.00	502.43	500.87	5.64
221.55	274.95	243.68	242.10	241.89	242.75	242.05	502.81	501.12	5.64
222.05	276.06	243.57	242.12	241.89	242.73	242.05	502.55	499.46	5.66
222.54	276.48	243.68	241.94	241.69	242.57	241.93	500.90	499.01	5.65
223.05	276.64	243.70	241.89	241.68	242.56	241.89	500.88	499.16	5.57
223.54	276.94	243.56	241.93	241.70	242.59	241.95	500.97	499.32	5.60
224.05	276.92	243.56	241.93	241.72	242.59	242.16	501.14	499.38	5.63
224.55	276.98	243.24	241.98	241.75	242.65	241.98	501.60	499.56	5.63

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
225.05	276.62	243.53	241.98	241.77	242.99	241.61	501.60	499.43	5.65
225.54	276.58	243.56	241.97	241.75	242.65	242.04	501.37	499.49	5.65
226.04	276.40	243.35	241.86	241.65	242.58	241.75	501.26	500.24	5.59
226.54	276.22	243.64	242.01	241.79	242.70	241.83	501.99	500.15	5.61
227.05	276.17	243.98	242.01	241.77	242.69	242.08	501.81	500.11	5.63
227.55	275.78	243.49	242.04	241.81	242.74	242.15	502.26	500.60	5.65
228.05	275.19	243.51	242.04	241.83	242.74	242.20	502.00	500.29	5.67
228.54	274.56	243.48	242.04	241.83	242.74	242.19	502.18	500.37	5.64
229.04	273.79	243.44	242.10	241.87	242.78	242.24	502.59	500.55	5.59
229.55	273.20	243.53	242.08	241.87	243.14	241.90	502.16	499.98	5.65
230.05	272.64	243.43	242.03	241.81	242.71	242.21	501.76	499.88	5.63
230.55	272.25	243.44	241.99	241.78	242.69	242.21	501.62	499.78	5.63
231.04	271.57	243.55	241.97	241.76	242.69	242.21	501.57	499.84	5.69
231.55	271.35	243.70	241.98	241.74	242.67	242.21	501.55	499.76	5.61
232.04	271.27	243.47	241.98	241.74	242.69	242.23	501.59	499.82	5.58
232.55	271.61	243.45	241.99	241.76	242.71	242.25	501.63	499.77	5.62
233.05	272.39	243.30	241.98	242.25	242.75	241.19	502.21	500.42	5.62
233.55	273.41	243.20	242.07	242.30	242.78	241.98	502.40	500.26	5.62
234.05	274.49	243.41	242.10	241.89	242.82	242.36	502.63	500.61	5.67
234.54	275.22	243.57	242.09	241.87	242.80	242.37	502.39	500.44	5.63
235.05	275.91	243.61	242.05	241.82	242.79	242.36	502.08	500.29	5.59
235.55	276.50	243.58	242.03	241.80	242.75	242.36	501.99	500.23	5.62
236.05	276.64	243.60	242.02	241.80	242.75	242.36	501.90	500.15	5.65
236.54	277.38	243.36	242.02	241.78	242.74	242.36	501.97	500.16	5.64
237.05	277.33	243.42	242.04	241.80	242.77	242.38	501.97	500.24	5.67
237.54	276.97	243.53	242.04	241.82	242.77	242.40	502.08	500.28	5.62
238.05	276.34	243.26	241.72	241.82	242.79	242.42	502.41	500.46	5.60
238.55	275.95	243.44	242.06	241.38	242.79	242.42	501.82	499.46	5.65
239.04	275.72	243.51	241.95	241.75	242.70	242.35	501.25	499.34	5.63
239.55	275.58	243.44	241.93	241.74	242.70	241.70	501.76	500.03	5.65
240.04	275.40	243.64	241.99	241.77	242.74	242.24	501.64	499.66	5.70
240.55	275.39	243.49	242.01	241.81	242.76	242.42	501.93	500.04	5.59
241.05	274.83	243.51	241.99	241.76	242.72	242.38	501.35	499.76	5.60
241.54	274.33	243.44	242.03	241.81	242.76	242.46	501.96	500.11	5.65
242.05	273.74	243.39	242.04	241.83	242.80	242.60	502.06	500.17	5.64
242.54	272.93	243.46	242.03	241.81	242.76	242.46	501.94	499.81	5.65
243.05	272.41	243.35	242.03	241.79	242.76	242.44	501.66	499.68	5.67
243.55	271.92	243.46	241.97	241.76	242.73	242.42	501.37	499.50	5.59
244.04	271.37	243.53	241.96	241.74	242.71	242.40	501.33	499.55	5.61
244.55	271.62	243.41	241.98	241.76	242.75	242.42	501.56	499.71	5.63
245.05	271.77	243.38	241.98	241.76	242.73	242.44	501.41	499.69	5.63
245.54	272.33	243.41	241.98	241.76	242.73	242.44	501.57	499.69	5.65
246.05	273.30	243.45	241.98	241.76	242.75	242.44	501.57	499.77	5.66
246.54	274.14	243.22	242.32	241.78	242.77	242.86	501.62	499.74	5.58
247.05	275.18	243.41	242.03	241.82	242.78	242.50	502.14	500.02	5.60

Table B3. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
247.55	275.46	243.23	241.94	241.75	242.73	242.30	501.76	499.96	5.64
248.04	275.23	243.42	242.02	241.78	242.77	242.45	501.57	499.60	5.62
248.55	278.57	243.59	242.02	241.80	242.77	242.50	501.92	500.08	5.65
249.05	279.50	243.45	242.04	241.80	242.79	242.54	501.87	500.06	5.67
249.55	278.70	243.42	241.98	241.79	242.77	242.50	501.69	499.86	5.60
250.05	276.68	243.52	242.00	241.77	242.75	242.50	501.73	499.95	5.63
250.54	273.81	242.92	242.00	241.77	242.75	242.50	501.61	499.72	5.64
251.05	270.76	243.33	242.02	241.81	242.79	242.52	501.86	499.87	5.65
251.55	268.43	243.29	242.04	241.84	242.79	242.54	502.31	500.09	5.69
252.05	270.18	243.22	242.02	241.82	242.79	242.54	501.88	499.65	5.62
252.55	275.22	243.35	241.99	241.77	242.74	242.51	501.61	499.60	5.61
253.05	278.56	243.67	241.97	241.75	242.72	242.49	501.50	499.55	5.66
253.54	279.45	243.55	241.93	241.74	242.72	242.51	501.45	499.59	5.65
254.05	278.73	243.53	241.97	241.74	242.74	242.51	501.50	499.61	5.66
254.54	276.97	243.53	241.83	241.63	242.63	242.26	500.97	499.28	5.67
255.05	274.07	243.37	241.92	241.70	242.69	242.42	500.94	499.44	5.61

Table B4. Pressure and Temperature Data for Run 4.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
0.05	299.78	64.09	52.37	53.28	52.54	48.06	503.91	501.07	5.59
0.55	268.01	101.49	52.50	53.40	52.62	48.23	502.03	500.25	5.63
1.05	247.69	212.14	52.46	53.43	52.63	48.27	501.94	500.90	5.63
1.55	247.38	234.73	52.48	53.49	52.69	48.28	503.18	501.60	5.62
2.05	249.25	238.94	52.44	53.54	52.69	48.28	501.27	499.60	5.64
2.55	252.81	240.28	52.43	53.50	52.70	48.34	501.56	499.79	5.62
3.05	261.60	241.24	52.39	53.50	52.72	48.32	501.77	499.68	5.57
3.55	267.96	242.30	52.37	53.48	52.70	48.31	501.94	499.59	5.58
4.05	271.81	243.25	52.45	53.47	52.71	48.31	501.81	499.49	5.62
4.55	274.13	243.73	52.52	53.38	52.65	48.23	502.09	499.47	5.62
5.04	275.79	243.72	52.78	53.37	52.63	48.23	502.56	500.07	5.62
5.55	276.58	244.08	53.10	53.35	52.65	48.22	502.79	499.89	5.64
6.05	276.56	244.17	53.48	53.35	52.64	48.22	502.98	499.78	5.64
6.55	276.16	244.22	53.84	53.36	52.64	48.24	503.18	499.63	5.57
7.05	275.00	244.21	54.25	53.36	52.66	48.25	503.60	500.17	5.58
7.55	274.38	244.23	54.63	53.37	52.65	48.25	504.57	500.42	5.62
8.05	273.08	244.13	55.10	53.39	52.65	48.26	504.36	500.32	5.62
8.55	272.09	244.24	55.51	53.40	52.68	48.26	504.83	500.20	5.62
9.05	271.67	244.20	56.00	53.40	52.67	48.27	505.27	500.11	5.64
9.55	270.94	244.26	56.49	53.39	52.69	48.29	505.11	500.01	5.65
10.05	270.49	244.30	57.06	53.39	52.61	48.28	505.38	499.93	5.57
10.55	270.20	244.36	57.72	53.38	52.70	48.30	505.42	499.91	5.58
11.05	270.05	244.43	58.30	53.42	52.69	48.27	505.59	499.76	5.64
11.55	269.93	244.52	58.94	53.43	52.71	48.31	505.83	499.68	5.62
12.05	270.07	244.53	59.64	53.43	52.65	48.32	506.04	499.59	5.61
12.55	270.30	244.60	60.39	53.42	52.74	48.32	506.17	499.56	5.64
13.05	270.34	244.75	61.18	53.45	52.73	48.35	507.22	500.86	5.64
13.55	270.35	244.95	62.08	53.43	52.75	48.34	508.45	500.88	5.57
14.04	270.16	245.05	63.12	53.46	52.76	48.34	508.50	500.78	5.59
14.55	269.92	245.22	64.21	53.46	52.77	48.35	508.65	500.68	5.63
15.05	269.90	245.36	65.43	53.45	52.75	48.33	509.21	500.66	5.62
15.55	269.81	245.53	66.88	53.43	52.74	48.34	509.78	500.63	5.62
16.05	269.76	245.78	68.42	53.42	52.74	48.35	509.79	500.58	5.64
16.55	269.89	245.72	70.06	53.42	52.73	48.33	510.19	500.54	5.65
17.05	269.86	245.80	71.78	53.39	52.74	48.30	509.94	500.45	5.58
17.55	270.12	245.85	73.10	53.29	52.66	48.24	509.65	500.26	5.60
18.05	270.50	245.81	74.35	53.30	52.62	48.21	509.26	500.18	5.65
18.55	271.12	245.80	75.58	53.32	52.69	48.21	509.78	500.08	5.64
19.05	271.29	245.85	77.02	53.31	52.66	48.22	508.96	500.01	5.64
19.55	271.45	245.92	78.52	53.30	52.71	48.21	508.90	500.04	5.68
20.05	271.90	245.95	79.92	53.28	52.73	48.19	509.06	499.96	5.59
20.54	272.16	245.96	81.31	53.31	52.77	48.20	509.26	499.94	5.59
21.05	272.39	245.90	82.58	53.30	52.79	48.23	508.19	499.78	5.63
21.55	272.40	245.98	83.96	53.29	52.80	48.21	508.79	499.90	5.63
22.05	272.39	246.06	85.44	53.31	52.85	48.22	509.21	499.89	5.63

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
22.55	272.47	246.06	86.84	53.34	52.88	48.23	509.33	499.81	5.65
23.04	272.74	246.05	88.29	53.35	52.91	48.24	509.11	499.79	5.66
23.55	272.93	246.04	89.60	53.36	53.04	48.25	509.98	499.81	5.59
24.05	272.85	245.96	91.16	53.37	52.99	48.23	510.07	499.76	5.60
24.55	272.39	245.99	92.88	53.38	53.00	48.26	509.66	499.78	5.65
25.05	272.26	246.02	94.57	53.43	53.03	48.25	510.47	499.81	5.64
25.55	272.23	246.00	96.34	53.46	53.06	48.26	510.39	499.71	5.64
26.04	272.03	246.03	98.17	53.49	53.06	48.31	510.49	499.71	5.67
26.55	272.16	246.00	99.93	53.52	53.09	48.36	511.59	499.72	5.60
27.05	271.82	246.05	101.97	53.57	53.08	48.39	512.07	499.78	5.58
27.55	271.93	246.11	104.35	53.62	53.09	48.48	512.30	499.78	5.62
28.05	271.92	246.12	107.00	53.67	53.10	48.54	512.04	499.78	5.64
28.55	272.15	246.13	109.91	53.72	53.07	48.63	511.57	499.68	5.63
29.05	272.25	246.14	112.90	53.80	53.16	48.66	511.63	499.69	5.65
29.55	272.68	246.13	116.00	53.83	53.17	48.73	512.93	499.62	5.65
30.05	272.92	246.11	119.28	53.92	53.18	48.80	511.37	499.50	5.59
30.54	272.89	246.26	122.46	54.01	53.21	48.86	512.14	499.79	5.61
31.05	273.19	246.04	125.40	54.09	53.24	48.91	511.49	499.91	5.65
31.55	273.40	245.87	128.23	54.18	53.23	48.96	511.36	500.98	5.62
32.04	273.64	246.00	130.56	54.26	53.24	48.99	512.29	501.09	5.65
32.55	273.69	245.96	133.43	54.35	53.25	49.04	512.43	499.48	5.69
33.04	273.73	245.88	137.12	54.46	53.28	49.09	511.02	499.39	5.61
33.55	273.69	245.98	139.77	54.58	53.29	49.17	511.11	503.15	5.60
34.05	273.59	245.98	140.72	54.65	53.22	49.18	512.93	503.01	5.63
34.55	273.71	245.99	144.03	54.77	53.29	49.23	512.37	499.26	5.63
35.05	273.48	246.05	149.61	54.91	53.32	49.30	513.09	502.27	5.64
35.55	273.76	246.08	153.49	55.04	53.33	49.34	513.77	499.81	5.67
36.05	273.54	246.18	160.56	55.22	53.32	49.39	513.78	499.71	5.64
36.55	273.33	246.23	169.17	55.38	53.33	49.44	514.15	499.77	5.60
37.05	273.21	246.25	177.52	55.56	53.34	49.51	514.23	499.42	5.61
37.55	273.35	246.33	185.19	55.74	53.36	49.53	514.02	500.25	5.64
38.05	273.21	246.25	192.14	55.92	53.33	49.56	514.12	500.42	5.64
38.54	273.74	246.22	196.87	56.12	53.40	49.59	514.54	502.46	5.66
39.05	273.53	246.45	202.52	56.30	53.41	49.64	516.89	499.11	5.66
39.55	273.33	246.47	212.73	56.55	53.44	49.69	516.31	500.61	5.59
40.05	273.42	246.52	218.29	56.79	53.45	49.71	516.96	500.81	5.62
40.55	273.90	246.46	221.47	57.05	53.44	49.74	517.80	500.54	5.65
41.05	273.28	246.48	224.90	57.30	53.46	49.79	517.51	500.67	5.64
41.55	273.36	246.46	227.30	57.56	53.47	49.82	516.57	500.58	5.66
42.05	273.75	246.48	229.75	57.85	53.50	49.84	516.77	500.60	5.67
42.55	274.29	246.33	231.40	58.13	53.47	49.89	517.15	500.50	5.60
43.05	274.32	246.46	232.89	58.42	53.52	49.92	516.59	500.54	5.60
43.55	274.72	246.41	233.87	58.71	53.51	49.96	516.55	500.38	5.65
44.05	274.86	246.46	235.34	59.00	53.51	49.97	516.38	500.45	5.63
44.55	274.97	246.45	236.36	59.35	53.52	50.00	515.76	500.20	5.64

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
45.05	274.87	246.47	237.48	59.70	53.55	50.05	516.40	500.00	5.69
45.55	274.88	246.50	238.22	60.03	53.54	50.07	517.09	501.17	5.60
46.05	274.93	246.52	238.92	60.40	53.55	50.10	517.22	499.51	5.59
46.55	274.18	246.64	239.95	60.83	53.54	50.17	517.92	499.77	5.64
47.05	273.97	246.68	240.73	61.27	53.60	50.17	518.78	499.78	5.62
47.55	273.71	246.73	241.37	61.73	53.59	50.22	518.88	499.78	5.63
48.05	273.53	246.79	241.84	62.25	53.64	50.25	519.56	499.93	5.66
48.54	273.45	246.94	242.12	62.79	53.64	50.27	520.16	499.98	5.63
49.05	273.33	246.91	242.45	63.36	53.65	50.32	520.65	499.94	5.58
49.55	273.30	246.97	242.69	63.94	53.68	50.36	520.94	499.94	5.61
50.05	273.89	246.96	242.82	64.55	53.71	50.37	521.40	499.80	5.65
50.55	273.71	246.99	242.95	65.16	53.71	50.42	521.12	499.94	5.65
51.05	273.85	247.01	243.07	65.81	53.76	50.44	521.09	500.05	5.67
51.55	274.43	246.87	243.00	66.48	53.75	50.49	519.69	500.16	5.67
52.05	274.24	246.86	243.10	67.17	53.79	50.52	519.73	500.39	5.58
52.55	275.16	246.78	243.03	67.78	53.82	50.56	519.62	500.38	5.59
53.05	274.85	246.84	243.11	68.41	53.83	50.59	519.62	500.44	5.64
53.55	275.14	246.76	243.06	69.06	53.85	50.61	519.19	500.26	5.62
54.04	275.45	246.73	243.04	69.70	53.78	50.64	519.01	500.18	5.65
54.55	275.52	246.70	243.02	70.35	53.88	50.65	518.64	500.13	5.68
55.05	271.60	246.62	243.01	71.06	53.91	50.69	518.31	500.10	5.61
55.55	273.91	246.62	243.04	71.74	53.94	50.70	518.84	500.05	5.60
56.05	274.74	246.65	243.10	72.50	53.96	50.71	519.05	500.09	5.64
56.54	275.18	246.73	243.16	73.30	53.99	50.73	519.89	500.14	5.64
57.05	275.08	246.80	243.22	74.13	54.01	50.76	520.25	500.25	5.64
57.55	274.40	246.97	243.40	75.06	54.04	50.78	521.72	500.47	5.67
58.05	274.51	246.96	243.43	76.02	54.08	50.79	521.85	500.47	5.62
58.55	274.41	247.11	243.57	77.08	54.11	50.81	523.25	500.76	5.59
59.04	274.11	247.19	243.62	78.36	54.15	50.84	523.29	499.43	5.61
59.55	273.97	247.23	243.71	79.72	54.20	50.85	524.00	500.38	5.63
60.04	273.94	247.32	243.81	81.07	54.24	50.87	524.88	501.03	5.64
60.55	274.18	247.35	243.85	82.46	54.30	50.90	525.81	503.12	5.65
61.05	274.08	247.44	243.94	83.91	54.37	50.92	525.89	499.84	5.67
61.54	274.18	247.41	243.90	85.58	54.41	50.91	525.22	499.34	5.59
62.05	274.35	247.35	243.85	87.36	54.47	50.93	524.48	499.36	5.60
62.55	274.62	247.28	243.84	89.19	54.56	50.96	524.20	499.38	5.64
63.04	274.73	247.20	243.77	91.13	54.64	50.98	523.36	499.24	5.62
63.55	275.10	247.11	243.70	93.15	54.72	50.99	522.43	502.94	5.64
64.04	275.66	247.06	243.69	95.09	54.80	51.02	522.44	499.44	5.67
64.54	275.76	247.01	243.68	97.28	54.88	51.06	521.77	499.33	5.60
65.05	275.93	247.07	243.61	99.55	54.93	51.05	521.23	499.85	5.59
65.55	275.82	246.90	243.60	101.93	55.03	51.07	520.69	500.03	5.61
66.05	275.67	246.87	243.61	104.30	55.13	51.12	520.37	500.04	5.62
66.54	272.47	246.84	243.59	106.69	55.17	51.10	520.21	500.09	5.63
67.05	274.13	246.81	243.60	109.06	55.27	51.13	520.23	500.16	5.64

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
67.55	274.37	246.85	243.59	111.53	55.35	51.15	520.47	500.14	5.66
68.05	274.59	246.93	243.68	114.21	55.45	51.14	521.18	500.15	5.59
68.55	275.01	246.79	243.70	117.06	55.54	51.16	521.31	500.09	5.59
69.05	274.80	247.06	243.85	120.24	55.66	51.19	522.77	500.17	5.64
69.55	274.55	247.10	243.93	123.95	55.76	51.19	523.31	500.01	5.63
70.05	273.37	247.22	244.06	128.32	55.88	51.21	524.70	500.15	5.64
70.54	272.02	247.27	244.14	133.84	56.01	51.20	524.84	500.16	5.68
71.04	273.52	247.37	244.21	140.54	56.17	51.22	525.62	500.28	5.62
71.55	274.57	247.37	244.20	149.92	56.33	51.25	525.48	500.15	5.59
72.05	274.48	247.41	244.22	162.32	56.49	51.25	525.47	500.26	5.61
72.55	274.36	247.40	244.19	175.63	56.64	51.26	525.19	500.32	5.63
73.05	274.66	247.28	244.03	189.74	56.82	51.30	524.18	500.32	5.63
73.55	274.82	247.18	243.93	198.24	57.03	51.35	522.94	500.26	5.66
74.05	275.82	247.07	243.81	204.28	57.24	51.35	522.36	500.12	5.65
74.54	275.64	247.04	243.78	210.62	57.44	51.37	521.39	500.08	5.58
75.05	275.90	246.92	243.69	215.86	57.67	51.39	520.40	500.00	5.59
75.55	276.10	246.82	243.57	219.73	57.88	51.42	519.50	499.80	5.65
76.05	276.16	246.80	243.47	222.01	58.10	51.44	518.49	499.72	5.64
76.55	276.04	246.61	243.40	224.04	58.23	51.47	517.64	499.67	5.64
77.04	275.77	246.49	243.33	225.21	58.54	51.49	516.89	499.83	5.68
77.55	275.83	246.39	243.23	225.80	58.74	51.50	515.71	499.66	5.59
78.05	275.42	246.35	243.23	226.45	58.97	51.52	515.45	500.07	5.59
78.55	275.71	246.23	243.11	226.85	59.18	51.54	514.87	498.86	5.64
79.04	275.28	246.25	243.17	228.05	59.41	51.55	514.91	500.29	5.64
79.54	274.93	246.31	243.23	229.41	59.63	51.55	515.25	500.33	5.64
80.05	274.95	246.42	243.28	230.01	59.90	51.57	515.97	499.66	5.66
80.54	274.61	246.37	243.36	231.80	60.17	51.58	516.04	500.27	5.62
81.05	274.33	246.45	243.47	233.19	60.45	51.60	516.80	500.30	5.59
81.55	274.91	246.47	243.51	234.53	60.78	51.62	516.90	500.26	5.62
82.04	274.57	246.55	243.62	235.90	61.14	51.67	517.61	500.36	5.64
82.55	274.57	246.57	243.66	237.18	61.54	51.69	517.75	500.43	5.63
83.05	274.60	246.59	243.69	237.75	61.95	51.71	517.55	500.43	5.66
83.55	274.85	246.52	243.64	238.58	62.39	51.76	517.10	500.31	5.64
84.05	274.85	246.54	243.68	239.16	62.83	51.78	517.13	500.43	5.61
84.54	275.22	246.46	243.63	239.27	63.25	51.78	516.90	500.26	5.61
85.05	275.19	246.46	243.65	239.65	63.84	51.84	516.50	500.33	5.64
85.55	275.35	246.43	243.60	239.69	64.41	51.89	515.71	500.29	5.63
86.05	275.34	246.29	243.49	239.75	64.98	51.91	514.62	500.36	5.65
86.54	275.92	246.24	243.46	239.82	65.55	51.95	514.27	500.26	5.67
87.05	275.78	246.19	243.41	239.57	66.04	51.99	513.73	500.30	5.59
87.54	276.10	246.10	243.36	239.58	66.69	52.01	513.09	500.17	5.61
88.05	276.00	246.02	243.38	239.78	67.26	52.04	513.36	500.22	5.65
88.55	275.82	246.07	243.37	239.55	67.88	52.08	512.99	500.21	5.63
89.05	275.21	246.11	243.39	239.62	68.55	52.08	513.16	500.25	5.63
89.55	274.96	246.08	243.39	239.50	69.23	52.12	513.25	500.20	5.69

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
90.05	275.11	246.06	243.37	239.45	69.97	52.16	513.07	500.21	5.60
90.55	274.88	246.12	243.43	239.54	70.76	52.19	513.64	500.30	5.59
91.05	274.85	246.18	243.45	239.56	71.65	52.23	513.97	500.38	5.64
91.55	274.85	246.20	243.49	239.82	72.59	52.27	514.20	500.43	5.64
92.05	274.80	246.24	243.51	239.91	73.59	52.31	514.40	500.41	5.64
92.54	274.61	246.28	243.52	239.90	74.82	52.35	514.02	498.49	5.68
93.04	274.46	246.19	243.45	239.92	76.03	52.41	513.51	500.36	5.62
93.55	274.97	246.16	243.45	240.12	77.29	52.46	513.59	500.42	5.59
94.05	274.90	246.22	243.49	240.23	78.62	52.51	513.70	500.44	5.63
94.55	274.74	246.18	243.48	240.23	80.05	52.57	513.67	500.38	5.64
95.04	274.89	246.15	243.46	240.23	81.59	52.62	513.39	500.46	5.65
95.55	271.02	246.12	243.44	240.29	83.20	52.71	513.17	500.43	5.67
96.05	273.74	246.05	243.41	240.24	84.96	52.76	512.68	500.28	5.63
96.55	275.48	246.01	243.36	240.22	86.74	52.78	512.75	500.21	5.61
97.04	275.60	246.00	243.35	240.19	88.62	52.84	512.07	500.22	5.65
97.54	275.86	245.98	243.31	240.18	90.56	52.88	511.79	500.14	5.62
98.04	275.93	245.95	243.28	240.20	92.54	52.94	511.40	500.05	5.64
98.55	275.96	245.90	243.25	240.13	94.55	53.02	511.09	499.96	5.68
99.05	276.44	245.88	243.21	240.08	96.56	53.08	510.79	499.88	5.63
99.55	270.29	246.01	243.23	240.19	98.64	53.12	510.74	499.52	5.60
100.04	273.68	245.84	243.17	240.19	100.87	53.22	510.28	500.14	5.64
100.55	275.73	245.89	243.19	240.30	102.98	53.28	511.04	500.23	5.64
101.05	276.06	245.99	243.26	240.39	105.24	53.37	511.52	499.73	5.64
101.55	276.10	246.01	243.28	240.41	107.72	53.45	511.60	500.36	5.66
102.05	275.98	246.10	243.36	240.47	110.38	53.53	512.43	500.58	5.64
102.54	275.94	246.12	243.41	240.49	113.31	53.63	512.58	500.64	5.60
103.05	276.25	246.23	243.43	240.53	116.62	53.73	513.11	500.71	5.64
103.55	275.84	246.21	243.45	240.60	120.46	53.84	512.98	500.82	5.63
104.04	276.20	246.18	243.42	240.59	124.84	53.96	512.84	500.74	5.65
104.55	276.11	246.24	243.47	240.61	129.35	54.08	513.25	500.93	5.67
105.05	276.06	246.18	243.44	240.52	134.15	54.19	512.81	500.76	5.65
105.55	276.62	246.19	243.42	240.59	138.80	54.33	512.99	500.73	5.60
106.05	276.35	246.15	243.39	240.52	143.56	54.48	512.41	500.70	5.63
106.55	276.72	246.07	243.32	240.38	147.91	54.62	511.50	498.33	5.64
107.05	276.45	246.00	243.22	240.38	152.86	54.77	510.61	500.23	5.64
107.55	276.69	245.89	243.15	240.32	156.66	54.93	510.10	500.25	5.68
108.05	277.27	245.91	243.13	240.32	159.32	55.06	510.31	500.09	5.64
108.55	277.09	245.84	243.12	240.29	161.66	55.22	509.85	500.15	5.59
109.05	276.95	245.88	243.12	240.32	163.70	55.35	510.02	500.36	5.61
109.55	276.77	245.88	243.14	240.33	165.58	55.49	510.10	500.35	5.64
110.04	276.71	245.85	243.11	240.34	167.35	55.66	509.85	500.28	5.64
110.54	277.22	245.92	243.14	240.40	169.07	55.83	510.22	500.37	5.65
111.04	277.76	246.00	243.16	240.46	171.00	56.03	510.55	500.46	5.64
111.54	278.38	246.20	243.20	240.51	173.06	56.20	510.95	500.61	5.59
112.05	278.63	246.14	243.26	240.57	175.16	56.43	511.25	500.72	5.60

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
112.55	278.89	246.20	243.26	240.61	177.12	56.62	511.47	500.83	5.64
113.04	279.23	246.27	243.31	240.66	179.17	56.85	512.25	500.96	5.63
113.55	278.82	246.33	243.37	240.75	181.36	57.08	512.30	501.19	5.66
114.05	278.73	246.35	243.39	240.77	183.43	57.41	512.53	501.14	5.68
114.55	278.93	246.32	243.25	240.68	185.58	57.71	510.84	500.81	5.60
115.04	279.83	246.23	243.20	240.67	187.45	58.06	510.74	500.23	5.60
115.54	280.79	246.30	243.22	240.69	188.92	58.34	510.95	500.76	5.65
116.04	281.26	246.37	243.24	240.69	190.09	58.69	511.12	500.92	5.63
116.55	281.75	246.39	243.24	240.67	191.26	59.03	511.15	501.03	5.64
117.05	281.88	246.40	243.22	240.68	192.39	59.39	510.99	501.02	5.69
117.55	282.08	246.36	243.21	240.66	193.48	59.77	510.63	500.93	5.61
118.05	282.44	246.33	243.17	240.63	194.47	60.16	510.27	500.85	5.59
118.55	282.75	246.26	243.12	240.57	195.39	60.53	509.82	500.66	5.64
119.05	282.75	246.29	243.09	240.58	196.32	60.95	509.68	500.66	5.64
119.55	281.96	246.19	243.07	240.56	197.12	61.35	509.37	500.55	5.64
120.04	280.86	246.12	243.05	240.58	197.90	61.77	509.12	500.47	5.68
120.54	279.78	246.10	243.04	240.58	198.51	62.23	509.16	500.58	5.63
121.05	279.15	245.96	243.02	240.56	199.39	62.70	508.81	500.09	5.60
121.55	278.49	245.78	242.91	240.51	200.32	63.23	507.92	500.52	5.65
122.05	277.68	245.80	242.91	240.60	201.18	63.74	508.30	499.38	5.63
122.55	277.28	245.78	242.95	240.66	202.00	64.27	508.50	500.37	5.65
123.05	277.10	245.86	243.01	240.77	202.79	64.84	509.33	500.58	5.69
123.55	277.00	245.91	243.08	240.89	203.58	65.49	509.86	501.07	5.61
124.05	277.02	246.02	243.13	241.02	204.50	66.15	510.57	501.42	5.61
124.55	276.91	246.04	243.19	241.09	205.25	66.87	510.61	501.45	5.66
125.05	277.14	246.04	243.17	241.15	206.20	67.62	510.81	501.53	5.65
125.55	277.29	246.15	243.17	241.20	207.26	68.42	510.42	499.61	5.65
126.05	277.25	245.97	243.09	241.17	208.39	69.36	509.30	499.23	5.67
126.55	277.42	245.92	243.00	241.17	209.87	70.32	508.74	499.04	5.59
127.04	277.64	245.82	242.93	241.17	211.04	71.29	508.21	499.85	5.60
127.54	277.94	245.78	242.88	241.19	212.11	72.25	507.73	500.12	5.67
128.05	278.57	245.73	242.86	241.21	212.58	73.21	507.39	499.95	5.64
128.54	279.44	245.71	242.81	241.25	213.03	74.15	507.09	500.06	5.64
129.05	279.32	245.69	242.81	241.32	213.42	75.15	506.94	500.10	5.67
129.55	278.90	245.66	242.77	241.34	213.82	76.12	506.70	499.98	5.61
130.05	279.14	245.61	242.74	241.36	214.32	77.14	506.48	499.89	5.60
130.54	278.91	245.62	242.76	241.43	214.55	78.15	506.62	499.96	5.64
131.04	279.21	245.72	242.74	241.45	215.14	79.24	506.41	499.88	5.65
131.55	279.16	245.68	242.74	241.50	215.68	80.35	506.72	499.93	5.65
132.04	278.53	245.68	242.76	241.56	216.26	81.49	506.69	499.95	5.69
132.55	278.42	245.65	242.78	241.59	216.88	82.69	506.64	499.92	5.61
133.05	277.83	245.72	242.78	241.69	217.67	83.93	506.99	500.02	5.61
133.54	277.69	245.72	242.80	241.74	218.44	85.27	507.18	500.02	5.65
134.05	277.36	245.79	242.84	241.81	219.41	86.67	507.40	500.01	5.65
134.55	277.15	245.76	242.76	241.78	220.90	88.22	506.58	500.15	5.65

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
135.05	277.13	245.72	242.75	241.81	222.24	89.73	506.68	500.06	5.69
135.54	277.20	245.71	242.76	241.87	223.05	91.28	506.95	500.09	5.61
136.04	277.26	245.73	242.80	241.91	223.91	92.99	506.96	499.97	5.60
136.54	277.78	245.73	242.80	241.93	225.02	94.72	507.09	500.11	5.66
137.05	277.89	245.75	242.81	241.96	225.63	96.53	506.91	500.06	5.64
137.55	277.51	245.75	242.79	241.96	226.45	98.40	506.70	500.02	5.65
138.05	277.69	246.00	242.73	241.93	227.09	100.31	506.23	499.93	5.68
138.54	277.91	245.67	242.70	241.91	227.52	102.25	505.88	499.86	5.61
139.05	278.32	246.45	242.66	241.89	227.99	104.20	505.66	499.82	5.62
139.55	278.70	246.93	242.61	241.86	228.49	106.14	505.15	499.66	5.65
140.05	279.28	246.99	242.56	241.81	229.10	108.06	504.76	499.56	5.64
140.54	279.57	247.04	242.54	241.81	229.68	109.96	504.90	499.54	5.65
141.05	279.34	247.04	242.54	241.79	230.31	111.86	504.68	499.56	5.69
141.54	278.94	247.03	242.47	241.72	232.67	113.96	503.61	499.95	5.61
142.05	279.10	246.95	242.42	241.70	233.49	115.58	503.61	499.77	5.63
142.55	279.00	247.04	242.45	241.77	233.82	117.01	504.17	499.92	5.65
143.05	278.37	247.08	242.52	241.81	234.25	118.61	504.50	499.99	5.65
143.55	278.21	247.12	242.56	241.85	234.86	120.54	504.88	500.02	5.67
144.05	277.65	246.81	242.63	241.93	235.77	122.53	505.49	500.07	5.64
144.55	277.58	245.85	242.65	241.95	236.63	124.73	505.91	500.09	5.60
145.05	277.22	245.54	242.69	241.99	237.85	127.11	506.02	500.14	5.64
145.55	277.09	245.36	242.69	241.95	238.96	129.59	505.94	500.07	5.64
146.05	277.32	245.33	242.65	241.96	239.59	132.17	505.80	500.04	5.65
146.54	277.38	245.36	242.67	241.96	240.04	134.83	505.89	500.15	5.65
147.05	277.51	245.33	242.64	241.94	240.38	137.62	505.68	500.02	5.64
147.54	277.54	245.29	242.62	241.90	240.60	140.29	505.39	499.92	5.58
148.05	277.82	245.26	242.59	241.85	240.76	142.91	505.01	499.77	5.62
148.55	278.41	245.17	242.44	241.69	240.85	145.50	503.44	499.90	5.64
149.04	278.81	245.15	242.41	241.65	240.97	147.33	503.29	499.80	5.63
149.55	278.79	245.13	242.41	241.65	241.03	148.98	503.28	499.86	5.65
150.05	279.10	245.10	242.39	241.64	241.08	150.41	503.22	499.87	5.66
150.55	279.06	245.12	242.39	241.66	241.10	151.72	503.26	499.87	5.58
151.05	279.19	245.12	242.41	241.64	241.17	153.06	503.33	499.90	5.60
151.54	279.35	245.22	242.41	241.64	241.24	154.41	503.33	499.84	5.63
152.05	278.88	245.12	242.41	241.66	241.26	155.77	503.41	499.89	5.62
152.54	278.95	245.10	242.41	241.66	241.30	157.12	503.58	499.87	5.63
153.05	278.68	245.14	242.43	241.66	241.37	158.51	503.57	499.91	5.66
153.55	278.67	245.24	242.46	241.68	241.44	159.94	504.09	500.02	5.60
154.04	278.16	245.26	242.48	241.71	241.52	161.46	504.05	499.94	5.59
154.55	278.40	245.39	242.48	241.71	241.57	163.04	504.53	499.99	5.61
155.05	277.60	245.57	242.52	241.77	241.64	164.74	504.53	500.06	5.63
155.55	276.97	245.89	242.39	241.62	241.57	166.70	502.94	499.89	5.62
156.05	277.08	246.73	242.38	241.66	241.66	168.38	503.29	499.88	5.63
156.54	277.03	247.17	242.43	241.73	241.77	169.82	503.76	500.01	5.66
157.05	277.03	247.42	242.45	241.75	241.79	171.35	503.55	499.96	5.59

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
157.54	277.32	247.97	242.41	241.73	241.82	172.93	503.40	499.96	5.59
158.05	277.70	248.46	242.39	241.75	241.88	174.46	503.40	499.93	5.63
158.55	278.09	248.56	242.40	241.77	241.91	176.00	503.35	499.93	5.64
159.05	278.72	248.85	242.40	241.77	241.89	177.60	503.13	499.84	5.65
159.55	279.61	249.16	242.36	241.75	241.93	179.13	502.87	499.67	5.67
160.05	279.55	249.66	242.34	241.77	241.95	180.61	502.76	499.67	5.63
160.55	279.63	249.63	242.31	241.73	241.93	181.97	502.40	499.41	5.61
161.05	279.30	249.86	242.31	241.75	241.95	183.15	502.47	499.51	5.64
161.54	279.23	249.71	242.27	241.75	241.95	184.28	502.20	499.35	5.63
162.04	278.76	249.79	242.29	241.77	241.99	185.32	502.26	499.37	5.63
162.54	278.87	250.63	242.18	241.66	241.90	186.58	501.21	499.66	5.66
163.05	278.58	250.18	242.24	241.74	241.97	187.50	502.02	499.76	5.62
163.55	278.65	250.36	242.27	241.79	242.02	188.12	502.32	499.81	5.58
164.05	278.19	250.88	242.31	241.86	242.08	188.86	502.61	499.86	5.60
164.54	277.79	250.96	242.34	241.88	242.11	189.70	503.02	500.00	5.65
165.05	277.38	251.08	242.40	241.95	242.17	190.92	503.37	499.97	5.63
165.55	277.16	251.17	242.42	241.95	242.20	192.61	503.56	500.10	5.65
166.05	277.12	251.39	242.45	242.00	242.26	194.57	503.86	500.20	5.66
166.55	277.16	251.49	242.45	242.02	242.26	196.74	503.75	500.13	5.59
167.04	277.23	251.53	242.43	241.99	242.25	198.86	503.53	499.90	5.59
167.55	277.39	251.67	242.42	242.00	242.26	200.84	503.51	499.85	5.63
168.04	277.65	251.69	242.38	241.99	242.24	202.78	503.10	499.65	5.62
168.55	278.19	251.53	242.35	241.95	242.20	204.57	503.09	499.34	5.64
169.05	277.20	251.15	242.33	241.95	242.19	206.09	502.66	499.36	5.67
169.54	276.33	250.76	242.24	241.84	242.01	207.93	501.07	499.52	5.63
170.05	275.91	248.48	242.19	241.84	242.10	209.60	501.45	499.55	5.59
170.55	275.32	248.14	242.22	241.84	242.10	210.10	501.50	499.78	5.63
171.05	275.47	247.76	242.22	241.90	242.11	210.64	501.72	499.86	5.64
171.55	275.36	247.33	242.26	241.93	242.13	211.26	502.02	499.90	5.64
172.04	275.34	247.08	242.26	241.95	242.15	212.07	502.08	499.96	5.66
172.55	275.12	247.01	242.29	241.97	242.15	212.93	502.31	500.04	5.64
173.04	274.78	247.08	242.29	241.99	242.19	214.02	502.41	500.08	5.59
173.55	274.71	247.24	242.31	241.99	242.18	215.13	502.39	499.94	5.60
174.05	274.33	247.90	242.35	242.04	242.20	216.40	502.94	500.13	5.64
174.54	274.15	248.52	242.38	242.06	242.24	217.94	503.08	500.18	5.63
175.05	273.79	249.00	242.40	242.10	242.24	219.42	503.14	500.14	5.64
175.55	273.75	249.34	242.40	242.10	242.24	220.95	503.15	500.04	5.67
176.05	273.66	249.75	242.42	242.11	242.26	222.61	503.40	500.10	5.60
176.55	273.57	250.34	242.31	242.00	242.11	227.19	502.13	499.80	5.60
177.05	274.06	250.29	242.31	242.02	242.17	228.43	502.40	499.87	5.65
177.55	274.20	250.27	242.29	242.00	242.17	229.89	502.26	499.92	5.64
178.05	274.45	250.42	242.29	242.00	242.15	231.22	502.26	499.88	5.66
178.54	274.60	250.38	242.31	242.02	242.15	231.88	502.29	499.94	5.68
179.05	274.92	250.34	242.29	242.02	242.15	232.17	502.24	499.96	5.57
179.55	275.41	250.41	242.29	242.04	242.15	232.63	502.18	499.96	5.58

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
180.05	276.04	250.70	242.31	242.04	242.17	232.87	502.48	500.02	5.62
180.55	275.99	250.99	242.29	242.02	242.15	232.88	502.14	499.85	5.63
181.05	276.24	251.33	242.29	242.02	242.13	233.19	502.41	499.81	5.64
181.54	275.79	251.53	242.27	242.00	242.11	233.57	501.89	499.68	5.68
182.05	275.64	251.62	242.27	242.02	242.11	233.87	502.00	499.71	5.64
182.54	275.57	251.46	242.27	242.01	242.13	234.25	501.95	499.64	5.62
183.05	275.46	250.83	242.27	242.02	242.11	234.57	501.96	499.57	5.63
183.55	275.05	251.42	242.15	241.90	242.08	236.40	500.98	499.72	5.63
184.05	275.29	249.86	242.22	241.97	242.10	237.08	501.74	499.99	5.63
184.54	274.96	249.43	242.27	242.02	242.15	239.14	502.15	500.16	5.65
185.04	274.67	249.65	242.29	242.02	242.15	239.75	501.84	500.03	5.64
185.54	275.00	249.92	242.31	242.06	242.20	240.02	502.80	500.41	5.59
186.05	274.22	249.84	242.36	242.11	242.26	240.20	502.77	500.54	5.62
186.55	274.46	250.27	242.37	242.11	242.28	240.30	502.96	500.42	5.63
187.05	274.26	250.89	242.37	242.10	242.29	240.38	502.65	500.18	5.63
187.54	274.44	251.30	242.33	242.06	242.26	240.45	502.38	499.86	5.66
188.05	275.02	251.71	242.30	242.03	242.24	240.49	502.30	499.73	5.67
188.54	274.84	251.91	242.30	242.03	242.26	240.52	501.94	499.59	5.60
189.05	274.93	251.96	242.24	241.99	242.31	240.59	501.67	499.37	5.61
189.55	275.18	252.06	242.26	241.99	242.22	240.63	501.73	499.44	5.65
190.04	275.29	252.07	242.23	241.98	242.23	240.70	501.46	499.34	5.64
190.55	275.63	252.65	242.16	241.89	242.15	240.74	500.64	498.89	5.65
191.05	275.69	252.74	242.21	241.98	242.26	241.01	501.45	499.85	5.66
191.54	275.82	252.60	242.25	242.01	242.30	241.12	501.82	499.86	5.59
192.05	275.92	252.62	242.23	241.96	242.27	241.21	501.41	499.76	5.60
192.54	276.09	252.74	242.23	241.98	242.28	241.28	501.50	499.89	5.64
193.05	276.21	252.94	242.25	242.02	242.34	241.34	501.90	500.09	5.64
193.55	275.87	252.96	242.25	242.02	242.32	241.37	501.75	499.94	5.65
194.05	275.21	253.11	242.29	242.04	242.38	241.41	501.93	500.01	5.68
194.54	275.05	253.16	242.31	242.06	242.40	241.45	502.14	500.13	5.59
195.05	274.85	253.14	242.29	242.06	242.40	241.45	502.18	500.06	5.59
195.54	275.26	253.18	242.31	242.07	242.43	241.48	502.56	500.05	5.65
196.05	274.58	253.20	242.33	242.09	242.49	241.50	502.50	500.18	5.64
196.55	274.74	253.20	242.33	242.08	242.47	241.50	502.46	500.15	5.65
197.05	274.46	253.31	242.36	242.11	242.53	241.54	502.62	500.25	5.69
197.54	274.29	253.40	242.22	241.93	242.40	241.41	501.02	499.55	5.61
198.05	274.44	252.95	242.28	242.03	242.49	241.58	502.03	500.04	5.60
198.54	274.87	252.54	242.30	242.06	242.55	241.60	502.25	500.06	5.65
199.05	274.79	252.68	242.30	242.03	242.53	241.56	501.48	498.83	5.64
199.55	275.13	253.04	242.23	242.01	242.53	241.63	501.67	499.91	5.65
200.04	275.69	252.61	242.25	242.03	242.57	241.67	501.76	500.01	5.69
200.54	275.66	252.71	242.27	242.01	242.59	241.66	501.64	499.76	5.62
201.04	275.83	252.78	242.23	241.98	242.57	241.62	501.32	499.65	5.60
201.55	276.32	252.83	242.21	242.00	242.61	241.66	501.47	499.69	5.64
202.05	276.31	252.71	242.22	241.98	242.61	241.68	501.23	499.65	5.63

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
202.55	275.97	252.67	242.23	242.00	242.63	241.70	501.40	499.77	5.65
203.04	276.18	252.44	242.22	241.99	242.65	241.68	501.30	499.63	5.68
203.55	272.35	252.32	242.26	242.02	242.69	241.72	501.59	499.83	5.61
204.04	274.69	252.16	242.24	242.01	242.76	241.70	501.64	499.83	5.59
204.55	274.87	252.32	242.28	242.03	242.73	241.72	501.78	499.90	5.64
205.05	275.29	252.54	242.26	242.03	242.73	241.71	502.06	499.78	5.65
205.54	274.82	253.31	242.17	241.96	242.68	241.65	501.24	499.52	5.64
206.05	274.99	252.96	242.23	242.00	242.73	241.69	501.47	499.60	5.67
206.54	274.79	253.12	242.28	242.05	242.79	241.74	501.97	500.04	5.62
207.05	274.90	253.21	242.29	242.05	242.82	241.77	502.11	500.19	5.60
207.55	274.70	253.43	242.34	242.09	242.79	241.80	502.32	500.33	5.64
208.04	274.81	253.79	242.31	242.05	242.83	241.77	502.09	499.95	5.64
208.55	274.69	253.95	242.29	242.04	242.83	241.77	501.93	499.79	5.65
209.05	274.82	253.92	242.25	242.02	242.81	241.74	501.60	499.38	5.68
209.54	275.30	254.04	242.24	242.01	242.81	241.74	501.44	499.44	5.62
210.05	276.22	253.99	242.21	241.97	242.80	241.72	501.26	499.38	5.59
210.54	276.25	254.10	242.23	241.99	242.83	241.74	501.53	499.82	5.63
211.05	276.10	253.92	242.25	242.01	242.84	241.78	501.62	499.70	5.64
211.55	275.83	253.91	242.25	242.01	242.84	241.78	501.53	499.84	5.64
212.05	275.94	253.84	242.14	241.91	242.75	241.69	500.70	499.65	5.66
212.54	275.94	253.82	242.18	241.91	242.77	241.69	500.67	499.55	5.62
213.05	275.91	253.68	242.20	242.00	242.86	241.82	501.44	499.91	5.59
213.54	276.04	253.39	242.25	242.04	242.88	241.82	501.66	500.12	5.62
214.05	275.59	253.40	242.27	242.04	242.88	241.82	501.77	500.15	5.64
214.55	275.38	253.59	242.26	242.04	242.92	241.85	501.84	500.23	5.63
215.05	275.34	253.72	242.26	242.03	242.89	241.79	501.62	499.89	5.64
215.54	274.77	254.01	242.28	242.05	242.90	241.85	501.82	500.04	5.67
216.04	274.68	254.01	242.24	242.03	242.91	241.85	501.71	499.82	5.59
216.55	274.81	254.21	242.26	242.05	242.93	241.87	501.93	499.98	5.61
217.05	274.41	254.18	242.28	242.05	242.93	241.87	501.87	499.91	5.65
217.55	274.99	254.25	242.27	242.03	242.93	241.89	501.86	499.87	5.62
218.05	274.96	254.42	242.29	242.06	242.95	241.91	502.05	500.06	5.66
218.54	274.69	254.33	242.29	242.04	242.94	241.91	501.90	499.88	5.67
219.05	274.62	254.38	242.15	241.90	242.78	241.79	500.61	499.58	5.59
219.54	275.03	254.13	242.22	241.99	242.90	241.92	501.60	499.96	5.61
220.05	275.31	254.05	242.30	242.05	242.94	241.96	501.73	499.53	5.64
220.55	275.52	253.91	242.23	242.01	242.91	241.96	501.47	499.90	5.64
221.04	275.51	253.91	242.23	242.01	242.93	241.98	501.47	499.84	5.64
221.55	275.85	253.91	242.21	242.00	242.89	241.94	501.26	499.68	5.68
222.04	276.29	254.04	242.22	241.98	242.88	241.98	501.46	499.63	5.60
222.55	276.08	254.08	242.20	241.98	242.90	241.98	501.15	499.59	5.59
223.05	276.64	254.10	242.18	241.97	242.88	241.99	500.97	499.55	5.65
223.54	272.91	254.13	242.20	241.99	242.90	242.02	501.16	499.70	5.63
224.05	274.57	254.08	242.22	241.99	242.90	242.06	501.15	499.67	5.64
224.55	275.45	254.12	242.23	242.01	242.92	242.08	501.38	499.78	5.67

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
225.04	275.52	254.44	242.26	242.05	242.98	242.16	501.78	500.21	5.61
225.55	275.42	254.61	242.28	242.05	242.98	242.16	502.09	500.23	5.59
226.04	275.03	254.75	242.30	242.09	242.98	242.21	502.05	500.16	5.63
226.55	274.87	254.88	242.22	241.95	242.84	242.06	500.44	499.32	5.63
227.05	274.69	254.85	242.22	242.00	242.92	242.18	501.48	499.74	5.63
227.55	274.76	254.94	242.29	242.08	242.97	242.27	502.11	500.34	5.66
228.04	274.91	254.83	242.33	242.10	243.01	242.35	502.36	500.35	5.64
228.54	274.89	254.85	242.35	242.12	243.03	242.35	502.44	500.47	5.59
229.04	275.06	254.73	242.33	242.10	243.01	242.35	502.14	500.18	5.61
229.55	275.27	254.73	242.30	242.07	242.96	242.35	501.81	499.82	5.64
230.05	275.42	254.84	242.28	242.03	242.98	242.35	501.66	499.80	5.62
230.55	275.60	254.76	242.23	242.00	242.91	242.34	501.23	499.30	5.64
231.05	275.98	254.69	242.20	241.98	242.90	242.34	501.01	499.22	5.67
231.55	276.92	254.83	242.20	241.97	242.88	242.38	501.10	499.12	5.59
232.04	276.35	254.83	242.20	241.99	242.90	242.38	500.99	499.33	5.59
232.55	276.62	254.76	242.17	241.95	242.90	242.38	500.80	499.31	5.64
233.05	273.83	254.78	242.19	241.99	242.91	242.42	501.09	499.47	5.64
233.55	274.81	254.71	242.08	241.85	242.78	242.30	500.10	498.93	5.66
234.05	275.49	254.61	242.16	241.96	242.80	242.39	500.66	499.13	5.67
234.55	275.80	254.68	242.21	242.02	242.95	242.50	501.55	499.85	5.61
235.04	275.80	254.56	242.27	242.04	242.97	242.52	501.59	500.09	5.61
235.55	275.79	254.63	242.31	242.07	243.01	242.58	502.13	500.34	5.66
236.05	275.23	254.62	242.31	242.08	243.01	242.56	501.86	500.19	5.63
236.54	275.39	254.74	242.31	242.06	242.99	242.58	502.07	500.19	5.66
237.05	274.75	254.78	242.30	242.08	243.01	242.62	501.98	500.25	5.67
237.54	275.00	254.82	242.30	242.06	243.01	242.62	501.92	500.17	5.60
238.05	275.38	254.98	242.30	242.07	243.02	242.62	502.10	500.05	5.61
238.55	274.72	255.00	242.32	242.07	243.02	242.66	501.99	500.19	5.65
239.04	274.68	254.97	242.30	242.05	243.00	242.64	501.80	499.98	5.63
239.55	274.88	254.97	242.29	242.04	242.97	242.65	501.83	499.81	5.64
240.05	275.10	255.05	242.27	242.04	243.01	242.66	501.71	499.89	5.69
240.55	275.16	255.05	242.15	241.90	242.83	242.51	499.95	499.19	5.59
241.04	275.68	255.01	242.11	241.92	242.85	242.54	500.37	499.34	5.59
241.54	275.94	255.02	242.22	242.01	242.96	242.65	501.35	499.84	5.64
242.05	276.15	254.95	242.24	242.01	242.96	242.67	501.25	499.72	5.64
242.55	276.28	255.09	242.25	242.03	242.98	242.69	501.48	500.05	5.64
243.05	276.19	254.97	242.25	242.03	242.98	242.70	501.39	500.00	5.67
243.54	276.79	255.02	242.25	242.03	242.98	242.70	501.56	499.89	5.61
244.04	276.20	255.01	242.23	242.02	242.95	242.70	501.32	499.87	5.58
244.54	275.75	254.95	242.24	242.04	242.97	242.70	501.30	499.88	5.63
245.05	275.50	254.99	242.24	242.02	242.97	242.70	501.51	499.89	5.64
245.55	275.34	254.89	242.24	242.02	242.94	242.70	501.36	499.71	5.64
246.05	275.38	255.09	242.26	242.04	242.97	242.71	501.67	500.05	5.68
246.54	274.98	255.03	242.28	242.04	243.07	242.74	501.71	500.13	5.62
247.04	275.67	255.09	242.28	242.05	243.01	242.76	501.96	500.09	5.60

Table B4. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
247.54	274.68	255.29	242.17	241.96	242.91	242.64	500.90	499.19	5.65
248.05	274.50	255.16	242.16	241.92	242.87	242.62	500.60	499.09	5.64
248.55	274.84	255.11	242.25	242.03	242.98	242.75	501.68	500.08	5.66
249.05	275.19	255.27	242.32	242.11	243.06	242.81	502.27	500.51	5.70
249.55	275.05	255.24	242.32	242.11	243.13	242.79	502.12	500.26	5.60
250.05	275.17	255.30	242.31	242.06	243.01	242.77	501.85	500.22	5.60
250.55	275.18	255.26	242.27	242.04	243.01	242.76	501.48	499.72	5.65
251.05	275.34	255.23	242.22	242.01	242.96	242.72	501.09	499.51	5.62
251.55	275.81	255.25	242.19	241.97	242.92	242.69	500.75	499.14	5.63
252.05	276.78	255.27	242.15	241.94	242.91	242.67	500.53	499.11	5.66
252.55	276.34	255.31	242.17	241.94	242.89	242.67	500.59	499.16	5.61
253.04	276.43	255.18	242.14	241.92	242.89	242.66	500.44	499.09	5.58
253.55	276.74	255.24	242.14	241.93	242.89	242.66	500.73	499.23	5.61
254.05	275.76	255.20	242.16	241.93	242.91	242.70	500.85	499.38	5.64
254.54	273.51	255.11	241.96	241.77	242.77	242.29	499.49	498.23	5.63
255.05	275.41	255.13	242.07	241.86	242.83	242.57	499.99	498.55	5.64

Table B5. Pressure and Temperature Data for Run 5.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
0.05	228.20	54.58	50.77	51.78	49.87	43.32	496.47	499.43	5.59
0.55	240.00	86.92	50.67	51.76	49.78	43.28	498.87	499.80	5.59
1.05	244.91	122.52	50.77	51.80	49.80	43.38	498.78	499.72	5.64
1.55	245.69	226.36	50.81	51.90	49.88	43.52	500.28	501.05	5.61
2.05	247.27	239.72	50.89	52.05	50.09	43.67	500.11	500.74	5.56
2.55	250.77	241.30	50.93	51.94	50.15	43.69	499.87	500.44	5.55
3.05	256.46	241.78	50.97	51.96	50.20	43.71	499.76	500.13	5.57
3.55	263.72	242.23	51.00	51.99	50.28	43.75	499.16	499.99	5.60
4.05	271.57	242.53	51.10	52.00	50.26	43.77	499.55	499.85	5.59
4.55	279.31	242.82	51.23	51.94	50.19	43.69	499.66	499.75	5.60
5.05	282.94	242.82	51.48	51.92	50.15	43.69	500.27	499.75	5.60
5.55	286.81	243.13	51.75	51.90	50.15	43.67	501.41	499.73	5.62
6.05	287.76	243.41	52.04	51.90	50.17	43.67	501.15	499.55	5.66
6.55	286.23	243.54	52.42	51.92	50.19	43.67	500.95	499.38	5.59
7.05	283.54	243.38	52.80	51.90	50.17	43.67	501.47	499.72	5.56
7.55	279.44	243.24	53.21	51.92	50.20	43.71	502.26	500.34	5.56
8.05	273.01	243.36	53.65	51.94	50.30	43.73	502.58	500.18	5.59
8.55	266.02	242.73	54.18	51.96	50.24	43.73	502.03	500.00	5.61
9.05	260.32	242.64	54.75	51.99	50.22	43.77	501.84	499.88	5.61
9.55	256.33	242.60	55.40	52.01	50.20	43.80	502.19	499.95	5.61
10.05	257.93	242.55	56.19	52.01	50.18	43.77	502.00	499.68	5.62
10.55	261.70	242.67	57.05	51.99	50.20	43.80	501.66	499.53	5.64
11.05	264.83	242.67	58.00	52.01	50.20	43.80	501.61	499.42	5.60
11.55	267.94	242.87	59.00	51.99	50.20	43.78	502.40	500.19	5.55
12.05	270.51	242.99	60.02	51.97	50.27	43.78	502.49	500.14	5.56
12.55	272.08	243.05	61.08	51.97	50.19	43.80	502.52	500.04	5.58
13.05	271.41	243.02	62.33	51.96	50.25	43.79	502.55	499.86	5.61
13.55	270.67	242.99	63.65	51.98	50.19	43.79	502.38	499.69	5.59
14.05	269.68	242.99	65.05	51.98	50.17	43.81	502.47	499.73	5.60
14.55	264.49	243.05	66.63	51.99	50.19	43.81	502.22	499.60	5.62
15.05	267.28	243.09	68.40	52.01	50.18	43.81	502.02	499.43	5.62
15.55	269.46	243.01	70.19	51.99	50.16	43.80	503.20	500.42	5.64
16.05	269.81	243.16	72.05	51.97	50.20	43.80	503.00	500.31	5.58
16.55	270.01	243.06	74.12	51.91	50.10	43.72	503.01	500.15	5.55
17.05	267.02	243.03	76.56	51.93	50.10	43.74	503.17	500.14	5.56
17.55	267.86	243.22	79.35	51.94	50.13	43.75	503.70	500.29	5.59
18.05	269.41	243.04	82.65	51.96	50.11	43.75	502.91	499.86	5.60
18.55	270.29	243.05	86.21	51.98	50.15	43.77	503.22	499.81	5.59
19.05	271.00	243.07	90.14	51.99	50.16	43.80	502.97	499.71	5.60
19.55	269.49	243.07	94.55	52.03	50.20	43.82	503.01	499.72	5.62
20.05	270.73	243.06	99.24	52.02	50.19	43.83	503.26	499.97	5.64
20.55	271.72	243.15	103.74	52.06	50.27	43.85	504.24	500.05	5.60
21.05	272.05	243.54	109.39	52.05	50.19	43.87	503.15	499.70	5.57
21.55	273.51	243.41	114.06	52.07	50.17	43.86	503.46	500.15	5.57
22.05	274.80	243.53	117.90	52.09	50.16	43.86	503.70	500.20	5.61

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
22.55	275.72	243.58	122.09	52.10	50.14	43.87	503.51	500.09	5.62
23.05	275.97	243.56	126.68	52.13	50.13	43.89	503.51	499.97	5.61
23.55	275.64	243.43	131.50	52.13	50.15	43.89	503.57	499.81	5.62
24.05	274.16	243.50	137.60	52.17	50.13	43.90	503.32	499.77	5.64
24.55	273.92	243.43	142.71	52.18	50.16	43.90	503.61	499.63	5.65
25.05	273.74	243.37	147.93	52.21	50.18	43.91	503.57	500.01	5.57
25.55	273.80	243.38	152.12	52.25	50.15	43.89	503.72	500.17	5.56
26.05	273.73	243.74	157.05	52.28	50.26	43.90	504.28	500.25	5.58
26.55	273.60	243.48	162.28	52.32	50.32	43.90	504.38	500.11	5.62
27.05	270.98	243.68	168.03	52.39	50.39	43.89	504.29	500.08	5.61
27.55	272.02	243.49	172.95	52.42	50.42	43.89	504.08	499.88	5.61
28.05	272.67	243.67	177.80	52.46	50.44	43.87	504.31	499.93	5.62
28.55	272.91	243.68	181.94	52.51	50.49	43.88	504.31	499.82	5.64
29.05	271.59	243.71	186.94	52.58	50.56	43.86	504.47	499.76	5.61
29.55	272.60	243.67	192.32	52.52	50.48	43.72	504.86	499.80	5.55
30.05	269.91	243.81	198.40	52.61	50.53	43.71	504.65	499.91	5.55
30.55	271.40	243.97	203.84	52.68	50.58	43.69	504.57	499.65	5.58
31.05	272.35	243.98	209.19	52.77	50.62	43.68	504.51	499.61	5.61
31.55	273.41	244.03	213.35	52.88	50.67	43.68	504.89	499.50	5.60
32.05	273.93	244.10	217.20	53.01	50.72	43.69	504.37	499.41	5.60
32.55	274.34	244.11	221.29	53.13	50.75	43.75	504.91	500.40	5.60
33.05	274.22	244.25	222.79	53.28	50.80	43.80	506.05	500.62	5.63
33.55	273.06	244.19	226.77	53.45	50.87	43.87	505.26	500.20	5.62
34.05	273.44	244.40	229.65	53.63	50.91	43.96	505.50	500.12	5.56
34.55	273.50	244.38	231.92	53.80	50.96	44.05	504.86	499.95	5.56
35.05	273.57	244.30	233.12	53.98	50.99	44.14	504.99	499.93	5.56
35.55	273.78	244.49	234.44	54.18	51.02	44.23	505.47	499.81	5.61
36.05	273.65	244.48	235.65	54.40	51.05	44.30	505.15	499.97	5.60
36.55	273.77	244.46	236.43	54.63	51.09	44.39	505.16	499.87	5.60
37.05	274.12	244.51	237.19	54.87	51.12	44.44	505.09	499.74	5.60
37.55	273.92	244.62	237.83	55.13	51.15	44.51	505.16	500.21	5.62
38.05	273.97	244.64	238.40	55.39	51.13	44.58	505.85	500.34	5.65
38.55	273.82	244.63	238.86	55.67	51.19	44.63	506.16	500.49	5.58
39.05	273.56	244.64	239.53	55.96	51.23	44.70	505.46	500.03	5.55
39.55	273.55	244.73	240.17	56.26	51.27	44.77	506.33	501.01	5.57
40.05	273.29	244.72	240.54	56.57	51.29	44.84	506.13	500.37	5.59
40.55	273.54	244.75	240.89	56.91	51.34	44.91	506.28	500.60	5.61
41.05	273.55	244.80	241.03	57.26	51.35	44.98	506.48	500.77	5.60
41.55	273.42	244.92	241.19	57.64	51.38	45.05	506.23	500.13	5.61
42.05	272.92	244.69	241.29	58.01	51.41	45.13	506.10	500.01	5.63
42.55	273.10	244.51	241.32	58.38	51.44	45.20	505.99	500.03	5.65
43.05	273.09	244.63	241.44	58.77	51.46	45.27	506.06	500.01	5.59
43.55	273.19	244.62	241.55	59.18	51.49	45.34	506.09	500.07	5.55
44.05	273.20	244.61	241.62	59.59	51.50	45.41	506.06	500.04	5.58
44.55	273.28	244.50	241.58	60.04	51.55	45.50	506.06	499.89	5.62

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
45.05	273.39	244.51	241.62	60.49	51.58	45.55	505.89	499.77	5.62
45.55	273.65	244.75	241.62	60.97	51.59	45.62	505.32	500.12	5.62
46.05	273.73	244.75	241.59	61.46	51.60	45.69	504.75	500.29	5.59
46.55	273.94	244.79	241.64	61.94	51.63	45.72	505.74	499.84	5.65
47.05	274.45	244.87	241.72	62.46	51.66	45.77	506.01	500.09	5.62
47.55	274.28	244.90	241.78	63.02	51.69	45.81	505.94	500.01	5.56
48.05	274.67	244.91	241.81	63.60	51.72	45.86	506.29	499.97	5.56
48.55	274.07	244.92	241.84	64.21	51.73	45.91	505.88	499.90	5.60
49.05	273.70	244.88	241.85	64.87	51.76	45.96	505.73	499.78	5.63
49.55	273.80	244.81	241.84	65.54	51.79	46.01	505.63	499.74	5.61
50.05	273.90	244.75	241.92	66.23	51.80	46.06	506.44	499.94	5.62
50.55	273.68	244.76	241.97	66.98	51.85	46.12	506.05	499.88	5.63
51.05	273.45	244.79	241.94	67.76	51.86	46.19	505.96	499.83	5.65
51.55	273.26	244.82	242.02	68.54	51.89	46.22	506.42	499.86	5.58
52.05	273.31	244.97	242.07	69.37	51.92	46.29	506.74	499.83	5.58
52.55	273.23	245.21	242.01	70.26	51.95	46.34	505.51	499.22	5.59
53.05	273.08	245.24	241.99	71.19	51.97	46.39	505.60	499.94	5.63
53.55	273.50	245.25	242.08	72.09	52.02	46.43	506.67	500.20	5.61
54.05	273.53	245.47	242.18	73.08	52.05	46.48	507.27	500.51	5.62
54.55	273.34	245.45	242.15	74.10	52.08	46.53	506.84	499.84	5.64
55.05	273.33	245.42	242.14	75.18	52.11	46.58	506.82	499.92	5.66
55.55	273.32	245.43	242.15	76.32	52.16	46.66	506.70	499.85	5.59
56.05	273.91	245.22	242.10	77.49	52.18	46.69	506.58	499.78	5.57
56.55	273.70	245.27	242.11	78.68	52.25	46.72	506.71	499.76	5.58
57.05	274.03	245.35	242.12	79.93	52.28	46.79	506.67	499.72	5.63
57.55	274.33	245.36	242.09	81.17	52.33	46.85	506.52	499.74	5.61
58.05	274.36	245.38	242.12	82.47	52.37	46.88	506.57	499.74	5.61
58.55	274.53	245.34	242.11	83.79	52.44	46.95	506.39	499.65	5.63
59.05	274.48	245.33	242.08	85.14	52.51	46.98	506.04	499.63	5.66
59.55	273.95	245.36	242.07	86.55	52.55	47.01	504.75	499.31	5.60
60.05	273.65	245.13	241.98	87.89	52.60	47.07	504.97	500.54	5.57
60.55	274.07	245.21	242.07	89.07	52.67	47.12	506.20	500.83	5.58
61.05	273.58	245.31	242.22	90.42	52.71	47.09	507.28	500.93	5.62
61.55	273.40	245.48	242.30	91.86	52.78	47.15	508.38	500.89	5.61
62.05	273.29	245.52	242.33	93.45	52.86	47.20	508.24	500.82	5.61
62.55	273.49	245.56	242.37	95.08	52.95	47.23	508.50	500.85	5.62
63.05	273.28	245.57	242.34	96.79	53.03	47.26	507.93	500.01	5.66
63.55	273.26	245.53	242.30	98.58	53.15	47.32	507.53	499.85	5.61
64.05	273.39	245.55	242.29	100.46	53.24	47.37	507.83	500.11	5.57
64.55	273.49	245.56	242.33	102.41	53.34	47.43	507.93	500.08	5.58
65.05	273.35	245.68	242.34	104.51	53.44	47.48	508.06	500.04	5.62
65.55	273.48	245.65	242.31	106.74	53.55	47.52	507.80	499.98	5.62
66.05	273.63	245.67	242.32	109.09	53.65	47.57	507.84	499.96	5.63
66.55	273.75	245.61	242.24	111.53	53.77	47.62	506.67	500.37	5.64
67.05	273.92	245.52	242.19	113.91	53.91	47.64	506.45	499.83	5.68

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
67.55	274.27	245.37	242.18	116.33	54.00	47.65	506.76	500.49	5.59
68.05	274.82	245.48	242.22	118.68	54.12	47.68	507.30	500.25	5.57
68.55	275.08	245.55	242.28	121.17	54.24	47.68	507.55	500.22	5.59
69.05	275.25	245.59	242.29	123.70	54.38	47.73	507.65	500.17	5.63
69.55	275.38	245.52	242.28	126.31	54.50	47.78	507.79	500.13	5.60
70.05	275.01	245.50	242.27	128.95	54.68	47.80	507.77	500.10	5.61
70.55	274.15	245.50	242.31	131.73	54.80	47.87	507.70	500.06	5.64
71.05	273.96	245.53	242.30	134.60	54.94	47.89	507.62	500.02	5.66
71.55	273.68	245.55	242.31	137.42	55.12	47.94	507.72	500.02	5.60
72.05	273.81	245.67	242.33	140.52	55.30	48.00	507.84	499.97	5.58
72.55	273.76	245.62	242.35	143.78	55.44	48.01	508.15	499.97	5.61
73.05	273.73	245.61	242.36	147.27	55.62	48.06	507.97	499.90	5.63
73.55	272.91	245.74	242.30	151.19	55.79	48.10	506.48	500.18	5.60
74.05	273.15	245.57	242.23	154.49	55.95	48.13	506.79	500.17	5.62
74.54	273.63	245.63	242.29	157.22	56.11	48.15	507.66	500.38	5.64
75.05	273.94	245.65	242.41	160.15	56.27	48.16	508.64	500.34	5.65
75.55	274.02	245.82	242.47	163.59	56.47	48.19	509.27	500.34	5.57
76.05	273.74	245.88	242.55	167.75	56.68	48.21	509.39	500.34	5.57
76.55	273.96	245.85	242.53	172.60	56.88	48.26	509.37	500.28	5.61
77.04	270.31	245.91	242.56	177.37	57.09	48.32	509.38	500.28	5.63
77.55	272.55	245.88	242.51	182.19	57.33	48.35	509.08	500.09	5.62
78.05	273.96	245.87	242.49	186.48	57.54	48.39	508.96	500.06	5.62
78.55	274.56	245.84	242.47	190.38	57.76	48.43	508.76	500.00	5.65
79.05	274.85	245.86	242.45	193.95	57.99	48.46	508.74	499.98	5.63
79.54	275.04	245.81	242.46	197.04	58.25	48.50	508.68	499.91	5.57
80.05	275.24	245.87	242.45	200.34	58.50	48.51	508.64	499.90	5.58
80.55	274.78	245.73	242.36	203.94	58.77	48.55	507.47	499.97	5.63
81.05	274.71	245.72	242.35	205.81	59.02	48.58	507.66	500.12	5.62
81.55	274.47	245.71	242.39	207.66	59.31	48.62	508.14	499.97	5.62
82.04	269.79	245.81	242.49	208.67	59.60	48.65	509.23	500.25	5.62
82.55	271.90	245.79	242.51	211.70	59.91	48.69	509.07	500.17	5.67
83.05	273.53	245.92	242.54	214.15	60.24	48.72	509.51	500.16	5.60
83.55	273.80	246.02	242.58	216.88	60.59	48.74	509.83	500.20	5.59
84.05	274.04	245.95	242.56	219.55	60.93	48.80	509.53	500.11	5.59
84.55	274.03	245.97	242.59	221.94	61.30	48.83	510.02	499.95	5.64
85.05	273.87	245.96	242.59	224.12	61.68	48.89	509.92	499.86	5.61
85.55	273.68	246.09	242.60	226.35	62.10	48.93	510.06	499.78	5.63
86.05	273.79	246.13	242.60	228.45	62.52	48.98	510.27	499.82	5.64
86.55	273.72	246.14	242.64	230.05	62.96	49.04	510.42	499.79	5.66
87.05	273.87	246.18	242.65	231.50	63.42	49.06	510.50	499.79	5.58
87.55	273.45	246.16	242.51	232.67	63.90	49.12	508.47	499.98	5.58
88.05	274.13	246.02	242.44	232.94	64.38	49.19	508.44	500.05	5.61
88.55	275.02	245.96	242.46	232.70	64.83	49.19	508.77	500.19	5.62
89.05	273.15	245.96	242.52	232.86	65.31	49.23	509.18	500.17	5.63
89.54	275.30	245.98	242.56	233.46	65.79	49.28	509.79	500.15	5.63

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
90.05	275.21	246.01	242.62	234.46	66.28	49.32	509.98	500.17	5.66
90.55	275.20	245.99	242.62	235.42	66.80	49.36	509.90	500.13	5.61
91.05	275.37	246.00	242.63	235.92	67.31	49.40	509.83	500.08	5.57
91.55	275.24	246.04	242.63	236.20	67.84	49.47	510.08	500.08	5.57
92.05	274.49	246.11	242.67	237.06	68.55	49.55	510.44	500.05	5.60
92.55	274.06	246.12	242.69	237.80	69.12	49.63	510.28	500.02	5.62
93.05	268.16	246.12	242.75	238.48	69.70	49.69	510.76	500.03	5.60
93.55	271.59	246.16	242.75	238.65	70.31	49.75	510.96	500.01	5.62
94.05	272.87	246.27	242.77	239.13	70.96	49.81	511.28	500.01	5.65
94.55	273.30	246.33	242.78	239.84	71.62	49.85	511.08	499.89	5.63
95.04	273.54	246.33	242.76	240.31	72.34	49.91	510.99	499.99	5.58
95.55	273.26	246.42	242.82	240.65	73.04	49.99	511.84	500.08	5.56
96.05	272.88	246.50	242.89	241.00	73.83	50.07	512.65	500.11	5.61
96.55	272.02	246.56	242.93	241.25	74.64	50.13	512.92	500.12	5.63
97.05	272.49	246.56	242.96	241.49	75.49	50.21	512.93	500.08	5.61
97.54	273.45	246.53	242.94	241.67	76.36	50.31	512.72	500.04	5.63
98.05	274.23	246.62	242.93	241.76	77.24	50.39	512.52	500.01	5.65
98.55	274.54	246.59	242.91	241.82	78.13	50.45	512.35	499.97	5.63
99.05	274.88	246.50	242.86	241.86	79.03	50.55	511.91	499.91	5.58
99.55	275.46	246.45	242.83	241.88	79.90	50.63	511.63	499.85	5.57
100.04	275.57	246.45	242.80	241.92	80.80	50.71	511.39	499.84	5.60
100.55	275.41	246.38	242.78	241.94	81.68	50.79	511.45	499.79	5.62
101.05	270.14	246.37	242.82	242.01	82.60	50.89	511.38	499.80	5.62
101.55	272.34	246.32	242.69	241.96	83.56	50.97	510.15	499.69	5.62
102.05	273.58	246.20	242.64	241.96	84.44	51.04	509.96	499.65	5.64
102.54	274.09	246.23	242.67	241.98	85.36	51.12	510.51	499.69	5.62
103.05	268.46	246.34	242.74	242.08	86.27	51.20	511.33	499.65	5.56
103.54	272.40	246.33	242.79	242.13	87.32	51.28	511.88	499.81	5.57
104.05	273.43	246.49	242.89	242.24	88.37	51.36	512.35	499.84	5.61
104.55	273.83	246.55	242.93	242.32	89.47	51.48	512.80	499.89	5.62
105.05	274.00	246.60	242.95	242.37	90.67	51.56	513.29	499.88	5.62
105.55	273.53	246.72	242.98	242.46	91.94	51.65	513.47	499.89	5.64
106.05	274.00	246.68	243.01	242.49	93.24	51.73	513.59	499.85	5.67
106.55	274.24	246.74	243.03	242.52	94.64	51.85	513.82	500.50	5.60
107.05	274.73	246.74	243.05	242.56	96.07	51.97	514.01	500.25	5.57
107.55	274.60	246.74	243.05	242.58	97.58	52.06	513.76	500.10	5.60
108.05	274.34	246.75	243.03	242.55	99.16	52.18	513.55	500.03	5.64
108.55	274.08	246.64	242.93	242.46	100.86	52.30	512.22	499.98	5.62
109.05	274.63	246.50	242.80	242.39	102.55	52.41	511.72	500.00	5.63
109.54	274.74	246.46	242.82	242.39	104.25	52.55	511.75	500.24	5.65
110.05	275.41	246.43	242.81	242.40	105.97	52.67	511.58	500.15	5.64
110.54	275.10	246.42	242.79	242.40	107.69	52.78	511.43	500.12	5.58
111.05	272.53	246.36	242.78	242.38	109.43	52.94	511.45	500.11	5.59
111.54	268.10	246.38	242.80	242.39	111.19	53.06	511.40	500.10	5.63
112.05	272.19	246.32	242.78	242.37	112.88	53.19	511.24	500.04	5.63

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
112.54	273.82	246.41	242.78	242.37	114.74	53.35	511.60	500.01	5.62
113.04	272.56	246.44	242.82	242.41	116.62	53.50	511.72	500.01	5.65
113.55	273.87	246.48	242.84	242.43	118.57	53.64	511.96	500.05	5.67
114.05	274.40	246.57	242.84	242.47	120.57	53.81	512.37	500.00	5.59
114.55	274.04	246.70	242.92	242.51	122.73	53.98	512.90	500.05	5.58
115.05	273.90	246.72	242.96	242.56	125.17	54.18	513.16	500.05	5.61
115.54	273.31	246.82	242.87	242.48	127.94	54.37	512.17	499.91	5.64
116.05	273.40	246.73	242.87	242.52	130.91	54.58	512.67	500.03	5.64
116.55	273.48	246.80	242.93	242.57	134.20	54.79	513.31	500.24	5.64
117.05	273.66	246.88	243.01	242.65	137.73	55.02	513.80	500.24	5.66
117.55	274.27	246.86	243.02	242.67	141.44	55.27	513.94	500.23	5.60
118.04	274.44	246.87	243.03	242.65	145.60	55.52	513.53	500.19	5.59
118.55	274.68	246.78	242.96	242.60	149.85	55.79	513.11	500.12	5.60
119.05	275.13	246.69	242.93	242.55	154.08	56.08	512.50	500.05	5.64
119.55	275.42	246.64	242.87	242.52	157.92	56.33	511.99	500.00	5.63
120.05	275.82	246.53	242.80	242.45	161.26	56.63	511.53	499.95	5.63
120.54	275.46	246.55	242.75	242.41	164.25	56.90	511.29	499.92	5.65
121.04	275.01	246.43	242.72	242.38	166.81	57.17	510.75	499.85	5.64
121.55	272.63	246.43	242.72	242.36	169.23	57.42	510.73	499.80	5.58
122.05	273.54	246.44	242.70	242.36	171.48	57.71	510.67	499.85	5.58
122.55	274.06	246.33	242.62	242.28	173.78	57.98	509.92	499.76	5.63
123.05	273.85	246.39	242.62	242.26	176.02	58.26	509.92	498.89	5.62
123.55	273.85	246.35	242.62	242.28	178.21	58.57	510.31	500.05	5.63
124.05	273.69	246.50	242.70	242.38	180.24	58.86	511.12	500.00	5.64
124.55	273.73	246.54	242.79	242.43	182.34	59.14	511.66	500.04	5.66
125.05	273.84	246.65	242.86	242.51	184.82	59.47	512.32	500.05	5.59
125.54	273.57	246.70	242.90	242.56	187.87	59.81	512.67	500.07	5.57
126.05	273.47	246.83	242.96	242.62	191.14	60.18	513.30	500.09	5.60
126.55	273.24	246.85	242.98	242.66	194.69	60.60	513.55	500.10	5.61
127.04	273.35	246.89	243.02	242.66	198.06	60.99	513.69	500.10	5.62
127.55	273.66	246.87	243.02	242.68	201.50	61.43	513.55	500.06	5.62
128.05	273.95	246.86	242.99	242.65	204.51	61.87	513.33	500.01	5.64
128.54	274.49	246.74	242.95	242.61	207.56	62.35	512.88	499.97	5.65
129.05	274.82	246.74	242.92	242.58	210.33	62.79	512.56	499.94	5.57
129.55	275.43	246.60	242.87	242.53	212.18	63.26	512.01	499.89	5.58
130.05	274.64	246.60	242.69	242.33	214.77	63.75	509.47	500.18	5.61
130.55	274.59	246.30	242.53	242.19	217.23	64.17	508.88	499.77	5.63
131.04	275.18	246.21	242.48	242.19	217.43	64.57	508.54	499.73	5.63
131.55	275.06	246.21	242.50	242.16	217.68	64.93	508.74	499.75	5.63
132.05	274.81	246.23	242.48	242.18	218.11	65.37	508.81	499.79	5.65
132.55	273.59	246.25	242.54	242.22	219.24	65.79	509.03	499.82	5.62
133.05	273.73	246.24	242.52	242.22	220.19	66.21	509.00	499.79	5.56
133.54	273.29	246.31	242.55	242.26	221.04	66.68	509.26	499.86	5.57
134.05	273.20	246.35	242.58	242.26	223.17	67.15	509.46	499.84	5.62
134.55	272.95	246.44	242.60	242.28	224.69	67.65	509.85	499.84	5.62

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
135.05	273.33	246.44	242.64	242.32	226.07	68.18	510.04	499.83	5.62
135.55	271.03	246.62	242.64	242.32	228.46	68.82	510.02	500.14	5.62
136.04	269.55	246.57	242.65	242.31	230.66	69.45	510.13	500.00	5.66
136.55	272.17	246.68	242.70	242.38	231.79	70.05	510.98	500.08	5.61
137.05	273.01	246.70	242.74	242.40	233.30	70.77	510.84	500.14	5.58
137.55	273.79	246.76	242.73	242.40	233.86	71.51	510.94	500.01	5.60
138.04	274.12	246.67	242.73	242.39	234.65	72.30	510.61	500.04	5.64
138.54	274.45	246.69	242.69	242.37	235.06	73.13	510.33	499.98	5.62
139.05	274.23	246.62	242.66	242.32	235.24	73.98	509.76	499.92	5.63
139.55	275.10	246.54	242.57	242.25	236.03	74.83	509.26	499.85	5.66
140.05	275.44	246.39	242.52	242.20	236.46	75.66	508.40	499.76	5.65
140.54	275.30	246.38	242.47	242.15	236.63	76.45	508.08	499.72	5.58
141.05	275.39	246.26	242.42	242.10	236.50	77.24	507.62	499.69	5.57
141.55	275.14	246.37	242.38	242.06	236.72	78.03	507.46	499.78	5.61
142.04	271.16	246.26	242.39	242.06	236.74	78.80	507.29	499.73	5.62
142.55	265.79	246.19	242.37	242.01	237.87	79.70	506.59	500.00	5.62
143.05	270.81	246.03	242.28	241.96	238.18	80.45	506.28	499.76	5.64
143.55	273.26	246.10	242.29	241.98	237.75	81.19	506.75	499.77	5.68
144.05	273.86	246.20	242.36	242.02	237.75	82.03	507.00	500.24	5.59
144.55	274.71	246.34	242.36	242.06	237.97	82.89	507.47	500.17	5.58
145.04	274.67	246.43	242.42	242.13	238.22	83.85	508.00	500.19	5.61
145.55	274.37	246.58	242.47	242.17	238.85	84.86	508.40	500.22	5.64
146.05	274.28	246.58	242.51	242.21	239.37	86.00	508.66	500.22	5.63
146.54	274.15	246.60	242.55	242.23	239.97	87.18	508.83	500.21	5.64
147.05	274.05	246.66	242.55	242.23	240.53	88.47	508.98	500.24	5.67
147.54	274.28	246.75	242.59	242.25	240.97	89.83	509.09	500.20	5.62
148.05	274.21	246.70	242.57	242.25	241.30	91.29	508.81	500.18	5.60
148.55	274.65	246.66	242.56	242.20	241.44	92.76	508.55	500.13	5.64
149.04	274.92	246.61	242.51	242.17	241.52	94.32	508.20	500.05	5.65
149.54	274.83	246.51	242.29	241.92	241.84	95.94	505.29	500.07	5.64
150.04	275.27	246.27	242.17	241.85	241.84	97.11	505.21	499.88	5.65
150.55	275.92	246.19	242.17	241.87	241.81	98.25	505.14	500.05	5.67
151.05	276.12	246.19	242.16	241.87	241.82	99.40	505.10	500.05	5.60
151.54	276.05	246.14	242.17	241.87	241.73	100.57	505.12	500.04	5.59
152.04	275.68	246.16	242.18	241.87	241.71	101.74	505.25	500.06	5.62
152.55	275.33	246.07	242.20	241.89	241.68	102.98	505.38	500.03	5.64
153.04	274.36	246.11	242.22	241.91	241.70	104.24	505.49	500.06	5.63
153.55	268.78	246.11	242.26	241.95	241.77	105.57	505.71	500.09	5.64
154.04	271.78	246.13	242.28	241.97	241.90	106.96	505.94	500.09	5.67
154.54	273.22	246.21	242.30	241.99	241.90	108.38	506.24	500.14	5.60
155.05	273.71	246.32	242.32	242.01	241.94	109.92	506.47	500.12	5.59
155.55	273.62	246.39	242.35	242.03	242.07	111.54	506.74	499.93	5.62
156.05	273.89	246.41	242.34	242.05	242.19	113.31	506.71	499.85	5.64
156.54	273.24	246.48	242.27	241.93	242.23	115.21	505.44	499.95	5.63
157.05	273.50	246.45	242.25	241.93	242.34	116.86	506.10	499.93	5.65

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
157.55	273.89	246.45	242.33	242.02	242.43	118.73	506.54	500.01	5.68
158.05	273.84	246.58	242.35	242.02	242.47	121.05	506.52	500.06	5.62
158.55	274.49	246.49	242.33	242.03	242.47	123.47	506.26	499.95	5.59
159.05	274.89	246.51	242.31	242.01	242.49	125.99	506.25	499.94	5.60
159.55	275.11	246.37	242.28	241.97	242.49	128.59	505.82	499.84	5.63
160.05	275.45	246.30	242.25	241.96	242.46	131.20	505.35	499.74	5.62
160.55	275.82	246.25	242.19	241.89	242.43	133.69	504.90	499.63	5.64
161.04	276.29	246.14	242.14	241.82	242.41	135.98	504.68	499.53	5.65
161.54	275.48	246.16	242.13	241.84	242.43	138.08	504.48	499.64	5.65
162.05	275.59	246.05	242.11	241.82	242.38	139.92	504.24	499.91	5.57
162.55	270.04	246.00	242.15	241.86	242.43	141.46	504.48	499.97	5.58
163.04	272.67	245.95	242.15	241.86	242.47	142.99	504.52	499.96	5.62
163.54	269.97	246.13	242.10	241.77	242.44	144.63	503.48	500.21	5.62
164.05	272.01	245.97	242.06	241.76	242.42	145.81	503.77	500.16	5.61
164.54	273.56	246.06	242.10	241.81	242.49	146.57	504.38	500.20	5.63
165.05	274.21	246.10	242.16	241.85	242.57	147.80	504.73	500.28	5.67
165.55	274.64	246.26	242.19	241.91	242.61	149.15	505.30	500.35	5.61
166.05	274.43	246.37	242.27	241.98	242.66	150.89	505.81	500.37	5.58
166.55	273.89	246.48	242.32	242.00	242.72	153.10	506.00	500.11	5.59
167.04	273.82	246.57	242.30	242.00	242.68	155.63	506.02	500.02	5.63
167.55	273.80	246.48	242.29	241.98	242.70	158.61	505.72	499.94	5.61
168.05	273.88	246.25	242.27	241.97	242.69	161.93	505.48	499.87	5.63
168.55	274.17	246.33	242.24	241.93	242.67	165.36	505.21	499.79	5.64
169.04	274.73	246.38	242.20	241.90	242.65	168.51	504.89	499.68	5.66
169.54	275.11	246.15	242.19	241.86	242.64	171.32	504.54	499.62	5.58
170.04	275.07	246.08	242.13	241.85	242.62	173.73	504.41	499.73	5.57
170.55	275.13	246.15	242.01	241.69	242.48	175.98	502.81	499.90	5.60
171.04	275.81	245.81	241.99	241.69	242.52	176.84	503.07	499.91	5.63
171.55	275.98	245.99	242.01	241.74	242.57	176.81	503.30	499.93	5.62
172.04	275.71	245.96	242.03	241.75	242.57	176.72	503.27	499.95	5.63
172.55	272.11	245.84	242.05	241.77	242.61	176.74	503.52	499.99	5.66
173.04	273.60	245.96	242.09	241.80	242.65	177.01	503.94	500.07	5.62
173.55	273.48	246.05	242.13	241.84	242.66	177.66	504.07	500.10	5.57
174.05	270.65	245.97	242.13	241.86	242.67	178.65	504.46	500.16	5.59
174.54	271.61	245.89	242.15	241.88	242.70	179.98	504.39	500.06	5.64
175.05	272.87	245.93	242.18	241.88	242.70	181.50	504.52	500.07	5.62
175.55	273.43	246.08	242.17	241.86	242.72	183.16	504.75	500.07	5.63
176.05	273.63	246.36	242.19	241.88	242.72	184.93	504.89	500.06	5.65
176.55	273.18	246.19	242.23	241.92	242.76	186.85	505.08	500.09	5.66
177.05	273.22	246.65	242.23	241.94	242.76	188.97	505.21	500.09	5.59
177.55	272.28	247.23	242.14	241.78	242.60	191.55	503.34	499.91	5.59
178.05	271.60	246.64	242.01	241.71	242.57	193.71	503.14	499.87	5.62
178.55	273.06	246.28	242.00	241.71	242.61	195.16	503.20	499.90	5.63
179.05	274.45	246.35	242.07	241.76	242.66	195.75	503.78	500.04	5.63
179.54	274.92	246.79	242.11	241.82	242.63	196.41	504.10	500.12	5.65

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
180.05	275.30	246.36	242.13	241.80	242.68	197.65	503.76	499.99	5.67
180.55	275.82	246.38	242.07	241.79	242.68	199.03	503.57	499.90	5.61
181.05	276.22	246.63	242.06	241.75	242.65	200.36	503.28	499.76	5.59
181.54	275.73	246.06	242.06	241.77	242.67	201.49	503.21	499.72	5.61
182.05	275.48	246.15	242.02	241.74	242.65	202.37	503.03	499.60	5.64
182.54	273.64	246.15	242.02	241.72	242.56	203.14	503.19	499.66	5.62
183.04	272.78	245.95	242.04	241.76	242.60	203.84	503.22	499.72	5.63
183.55	273.54	246.26	242.04	241.74	242.65	204.48	503.40	499.76	5.65
184.05	274.04	246.49	242.06	241.76	242.65	205.18	503.49	499.76	5.64
184.55	273.74	246.15	241.95	241.65	242.56	206.75	502.46	499.79	5.58
185.04	273.95	245.97	242.03	241.74	242.64	207.60	503.27	499.92	5.60
185.55	273.92	246.90	242.06	241.76	242.64	208.01	503.39	499.77	5.63
186.05	273.43	247.19	242.08	241.80	242.69	209.73	503.70	500.00	5.62
186.55	273.24	247.59	242.12	241.83	242.75	211.75	504.12	500.12	5.63
187.05	273.27	247.72	242.17	241.89	242.80	213.72	504.42	500.18	5.65
187.54	273.31	247.28	242.17	241.87	242.78	215.96	504.46	500.07	5.67
188.05	273.74	246.71	242.16	241.87	242.77	218.09	504.33	499.97	5.60
188.55	274.03	246.52	242.16	241.84	242.75	219.81	504.11	499.79	5.58
189.05	274.25	246.43	242.14	241.82	242.75	221.06	503.89	499.64	5.63
189.54	274.56	246.32	242.11	241.82	242.73	221.92	503.65	499.65	5.64
190.04	275.35	246.23	242.07	241.77	242.61	222.66	503.49	499.70	5.63
190.55	275.59	246.07	242.07	241.77	242.70	222.96	503.38	500.10	5.64
191.04	275.79	246.70	242.09	241.79	242.74	222.84	503.67	500.26	5.67
191.54	275.25	246.84	242.02	241.73	242.68	224.11	503.01	500.22	5.61
192.05	272.98	246.34	242.04	241.77	242.74	222.75	503.49	500.39	5.60
192.54	273.52	246.06	242.08	241.81	242.74	222.84	503.64	500.45	5.61
193.04	273.83	246.76	242.10	241.81	242.74	224.65	503.50	500.35	5.64
193.55	267.81	246.38	242.11	241.81	242.78	225.58	503.71	500.44	5.63
194.05	271.32	246.08	242.13	241.83	242.81	226.64	504.20	500.45	5.64
194.55	271.23	246.45	242.13	241.86	242.81	227.61	504.04	500.49	5.67
195.05	273.07	246.62	242.17	241.88	242.83	228.46	504.57	500.62	5.63
195.55	273.88	246.42	242.21	241.88	242.83	229.34	504.41	500.50	5.60
196.05	273.83	246.49	242.21	241.90	242.85	230.20	504.53	500.44	5.62
196.54	273.97	246.60	242.17	241.87	242.80	231.67	504.11	499.64	5.66
197.05	273.96	246.87	242.14	241.83	242.76	233.09	503.94	499.69	5.65
197.55	274.15	247.43	242.14	241.83	242.78	233.79	504.02	499.71	5.66
198.05	274.28	247.68	242.12	241.83	242.78	234.50	503.87	499.64	5.70
198.55	274.14	248.36	241.98	241.67	242.66	235.31	502.74	499.73	5.60
199.05	274.91	248.02	242.01	241.74	242.71	237.26	503.13	499.68	5.60
199.55	275.47	247.80	242.03	241.76	242.75	237.62	503.58	499.88	5.65
200.05	275.02	247.68	242.05	241.74	242.71	238.02	503.04	499.87	5.66
200.54	275.47	247.55	242.05	241.78	242.75	238.14	503.18	499.93	5.64
201.05	276.14	247.16	242.03	241.75	242.73	238.13	503.27	499.88	5.66
201.55	275.64	246.68	242.03	241.75	242.71	238.04	503.15	499.81	5.65
202.05	275.31	246.34	242.03	241.73	242.72	238.00	502.71	499.68	5.60

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
202.54	271.57	246.16	242.00	241.73	242.71	237.91	502.66	499.60	5.61
203.04	273.44	246.16	241.98	241.69	242.70	237.77	502.78	499.67	5.66
203.54	273.80	246.09	242.00	241.69	242.70	237.77	502.73	499.70	5.65
204.05	269.66	246.09	242.04	241.75	242.77	237.93	503.14	500.02	5.66
204.55	272.22	246.05	242.07	241.80	242.79	238.22	503.69	500.16	5.69
205.05	273.24	246.75	242.11	241.82	242.79	238.51	503.71	500.11	5.62
205.54	273.57	247.67	242.09	241.80	242.77	239.46	503.52	499.98	5.61
206.05	273.12	250.07	241.95	241.66	242.63	240.32	502.54	499.79	5.65
206.54	273.44	249.96	242.05	241.77	242.86	241.01	503.57	500.05	5.64
207.05	273.77	250.83	242.04	241.73	242.81	241.37	502.95	499.85	5.65
207.55	274.11	251.31	242.09	241.80	242.79	241.54	503.91	500.34	5.66
208.04	274.36	251.80	242.13	241.86	242.83	241.64	504.14	500.34	5.67
208.55	274.67	252.26	242.13	241.82	242.79	241.65	503.68	499.84	5.60
209.05	274.87	252.52	242.07	241.77	242.76	241.64	503.18	499.55	5.61
209.55	274.96	252.64	242.04	241.73	242.79	241.66	502.87	499.41	5.67
210.04	275.46	252.61	242.00	241.70	242.72	241.66	502.91	499.43	5.64
210.54	275.57	252.46	242.00	241.72	242.70	241.70	502.55	499.35	5.66
211.05	275.43	252.35	242.00	241.73	242.74	241.73	502.93	500.06	5.69
211.55	275.41	252.16	242.04	241.79	242.81	241.79	503.29	500.32	5.62
212.05	275.39	252.07	242.08	241.81	242.83	241.82	503.51	500.36	5.62
212.55	273.23	252.10	242.09	241.77	242.74	241.77	503.05	500.21	5.64
213.05	271.05	251.92	242.04	241.75	242.77	241.52	503.23	500.32	5.65
213.55	272.90	251.44	242.08	241.81	242.81	241.93	503.61	500.35	5.64
214.04	273.14	251.80	242.09	241.82	242.90	242.02	503.68	500.58	5.67
214.55	273.50	251.80	242.13	241.84	242.88	242.07	503.85	500.59	5.68
215.05	273.57	252.08	242.13	241.84	242.85	242.09	503.95	500.49	5.62
215.55	273.77	252.23	242.11	241.84	242.83	242.11	503.84	500.39	5.60
216.05	273.46	252.57	242.15	241.86	242.85	242.15	504.10	500.56	5.66
216.55	273.73	252.64	242.15	241.86	242.85	242.15	503.96	500.39	5.66
217.04	273.86	252.80	242.13	241.82	242.81	242.13	503.67	499.77	5.66
217.55	273.95	252.98	242.09	241.79	242.77	242.11	503.45	499.57	5.67
218.05	274.00	253.00	242.07	241.77	242.77	242.09	503.28	499.52	5.64
218.55	274.24	252.98	242.04	241.75	242.75	242.09	503.15	499.46	5.60
219.05	274.63	252.75	242.04	241.75	242.77	242.09	503.17	499.76	5.63
219.55	274.38	252.87	241.89	241.57	242.58	241.73	501.55	499.42	5.65
220.04	275.62	252.73	241.97	241.70	242.70	241.88	502.70	499.26	5.66
220.55	275.71	252.84	241.98	241.71	242.74	242.11	502.87	499.82	5.68
221.04	275.69	252.76	242.02	241.75	242.79	242.18	503.20	500.28	5.69
221.55	275.75	252.71	242.07	241.80	242.83	242.22	503.50	500.30	5.60
222.05	272.18	252.66	242.07	241.82	242.81	242.25	503.57	500.48	5.60
222.55	271.95	252.53	242.11	241.82	242.84	242.25	503.62	500.43	5.66
223.04	268.20	252.53	242.11	241.82	242.82	242.25	503.48	500.28	5.65
223.54	271.93	252.39	242.07	241.78	242.79	242.23	503.21	500.01	5.66
224.04	272.92	252.60	242.09	241.78	242.82	242.25	503.32	500.12	5.67
224.55	273.77	252.60	242.05	241.79	242.79	242.23	503.26	500.03	5.65

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
225.05	273.69	252.83	242.09	241.80	242.82	242.27	503.52	500.21	5.60
225.54	273.73	252.93	242.09	241.80	242.82	242.29	503.55	500.19	5.61
226.04	273.55	252.98	242.13	241.82	242.82	242.29	503.59	500.11	5.66
226.55	273.77	253.14	242.00	241.71	242.75	242.18	503.16	500.01	5.64
227.05	274.05	253.18	242.11	241.82	242.84	242.31	503.80	500.41	5.66
227.55	273.87	253.30	242.16	241.88	242.88	242.34	504.17	500.38	5.68
228.05	274.05	253.23	242.09	241.80	242.82	242.29	503.46	499.91	5.63
228.54	274.52	253.23	242.11	241.82	242.84	242.32	503.67	500.16	5.61
229.05	274.92	253.14	242.11	241.82	242.84	242.34	503.83	500.27	5.63
229.54	274.81	253.07	242.11	241.82	242.81	242.32	503.35	499.97	5.65
230.05	275.41	252.98	242.07	241.77	242.82	242.30	503.16	499.80	5.65
230.55	275.39	252.94	242.05	241.77	242.79	242.30	502.96	499.78	5.64
231.05	275.71	252.80	242.02	241.75	242.75	242.29	502.80	499.78	5.67
231.55	275.66	252.75	242.02	241.77	242.77	242.31	502.73	499.72	5.60
232.05	275.32	252.69	242.02	241.75	242.75	242.32	502.91	499.85	5.60
232.55	274.77	252.64	242.05	241.75	242.79	242.32	502.92	499.92	5.64
233.05	270.06	252.55	242.07	241.78	242.81	242.36	503.18	500.06	5.63
233.55	272.49	252.46	242.05	241.78	242.81	242.36	503.05	499.97	5.63
234.04	272.90	252.75	241.98	241.68	242.70	241.98	502.52	499.85	5.65
234.55	273.48	252.55	242.05	241.77	242.81	242.25	503.09	499.86	5.67
235.05	273.62	252.73	242.07	241.78	242.79	242.34	502.79	499.39	5.59
235.55	273.64	252.82	242.05	241.80	242.82	242.39	503.39	500.20	5.60
236.04	273.89	252.92	242.12	241.85	242.88	242.47	503.79	500.39	5.64
236.54	273.67	253.14	242.14	241.84	242.84	242.45	503.62	499.86	5.64
237.05	273.64	253.19	242.09	241.80	242.82	242.41	503.27	499.61	5.66
237.55	273.35	253.26	242.09	241.80	242.75	242.41	503.28	499.84	5.69
238.05	273.82	253.21	242.11	241.80	242.82	242.41	503.40	499.80	5.64
238.54	274.20	253.16	242.09	241.80	242.82	242.46	503.34	499.86	5.62
239.04	274.47	253.10	242.10	241.78	242.82	242.46	503.16	499.73	5.64
239.54	275.21	253.03	242.05	241.76	242.79	242.45	503.02	499.75	5.67
240.05	275.55	253.03	242.07	241.78	242.82	242.45	503.07	499.91	5.66
240.55	275.71	252.99	242.02	241.73	242.80	242.29	502.92	500.01	5.68
241.05	275.69	252.94	242.05	241.80	242.82	242.46	503.25	500.16	5.66
241.54	275.71	252.87	242.09	241.82	242.86	242.52	503.50	500.40	5.60
242.05	270.97	252.78	242.05	241.78	242.82	242.46	503.00	499.12	5.63
242.55	273.35	252.60	242.05	241.78	242.80	242.46	502.90	499.99	5.66
243.05	274.54	252.54	242.07	241.82	242.86	242.52	503.42	500.26	5.64
243.55	274.41	252.74	242.10	241.83	242.87	242.53	503.55	500.39	5.65
244.04	273.78	252.72	242.08	241.83	242.86	242.52	503.26	499.99	5.71
244.55	273.13	252.78	242.10	241.82	242.82	242.52	503.13	499.84	5.61
245.05	273.45	252.72	242.03	241.78	242.82	242.50	503.03	499.79	5.60
245.54	273.33	252.92	242.08	241.82	242.84	242.53	503.46	500.12	5.64
246.05	273.36	253.03	242.10	241.85	242.87	242.55	503.65	500.22	5.64
246.54	273.09	253.04	242.12	241.83	242.85	242.57	503.55	500.13	5.64
247.05	273.29	253.21	242.12	241.83	242.85	242.55	503.64	500.04	5.64

Table B5. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
247.55	273.42	253.22	242.12	241.83	242.84	242.53	503.25	497.93	5.67
248.05	273.74	253.26	242.05	241.78	242.84	242.46	503.38	499.93	5.60
248.54	274.12	253.22	242.10	241.83	242.87	242.59	503.51	500.06	5.61
249.05	274.48	253.24	242.06	241.78	242.82	242.51	502.89	499.77	5.65
249.54	275.18	253.12	242.07	241.81	242.85	242.58	503.38	500.17	5.62
250.05	275.72	253.11	242.08	241.85	242.89	242.62	503.58	500.29	5.62
250.55	274.37	253.12	242.10	241.81	242.87	242.60	503.24	500.04	5.65
251.04	274.75	252.94	242.05	241.76	242.80	242.55	502.75	499.65	5.69
251.55	275.00	252.90	242.01	241.76	242.82	242.55	502.69	499.60	5.61
252.04	275.15	252.77	242.01	241.74	242.82	242.53	502.65	499.63	5.61
252.55	274.14	252.74	242.01	241.74	242.83	242.51	502.27	498.34	5.65
253.05	273.52	252.59	242.01	241.76	242.82	242.53	503.10	500.11	5.65
253.55	273.34	252.58	242.08	241.83	242.89	242.62	503.59	500.30	5.63
254.04	269.52	252.72	242.12	241.85	242.92	242.65	503.91	500.56	5.65
254.54	270.23	252.68	242.12	241.85	242.87	242.64	503.44	500.02	5.65
255.04	271.99	252.90	242.02	241.76	242.80	242.49	502.87	499.95	5.59
255.55	273.40	252.86	242.08	241.83	242.87	242.60	503.36	500.08	5.59
256.04	273.37	252.78	242.04	241.77	242.81	242.52	502.92	500.09	5.60

Table B6. Pressure and Temperature Data for Run 6.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
0.00	274.09	62.99	52.04	53.19	52.08	46.55	501.69	499.60	5.57
0.55	275.40	96.01	52.15	53.27	52.11	46.69	502.52	500.72	5.59
1.05	269.90	230.59	52.16	53.32	52.18	46.72	501.62	499.90	5.62
1.55	267.13	243.30	52.15	53.31	52.17	46.73	501.50	499.76	5.62
2.05	267.02	248.57	52.13	53.41	52.17	46.72	501.85	499.81	5.61
2.55	267.59	251.66	52.10	53.32	52.24	46.77	501.86	499.63	5.63
3.05	268.52	252.87	52.09	53.20	52.23	46.74	501.84	499.57	5.64
3.55	268.26	252.83	52.08	53.13	52.24	46.71	501.63	499.36	5.58
4.05	268.01	252.13	52.09	53.12	52.24	46.75	501.35	499.15	5.57
4.55	268.02	251.62	52.08	53.15	52.22	46.68	502.36	500.45	5.60
5.05	268.52	251.12	52.05	53.12	52.15	46.60	503.25	500.93	5.63
5.55	268.49	250.41	52.08	53.10	52.17	46.64	503.16	500.72	5.62
6.05	268.56	250.62	52.14	53.13	52.18	46.63	502.90	500.51	5.63
6.55	268.46	250.50	52.21	53.10	52.17	46.62	502.80	500.36	5.64
7.05	268.42	250.18	52.29	53.11	52.18	46.63	502.63	500.23	5.62
7.55	268.32	249.88	52.41	53.13	52.20	46.63	502.65	500.18	5.56
8.05	267.84	249.82	52.57	53.14	52.21	46.68	502.62	500.14	5.56
8.55	267.34	250.13	52.71	53.05	52.16	46.59	502.40	499.90	5.59
9.05	266.91	249.55	52.91	53.06	52.15	46.58	502.31	499.84	5.62
9.55	266.21	249.05	53.16	53.07	52.13	46.56	502.46	499.82	5.61
10.05	265.93	249.04	53.45	53.07	52.12	46.59	502.27	499.74	5.60
10.55	265.27	249.11	53.78	53.06	52.13	46.58	502.28	499.69	5.64
11.05	265.13	248.33	54.19	53.06	52.13	46.56	502.20	499.62	5.64
11.55	264.92	249.23	54.65	53.11	52.14	46.61	502.42	499.67	5.57
12.05	264.79	248.47	55.17	53.12	52.18	46.63	502.40	499.60	5.55
12.55	264.85	248.85	55.74	53.14	52.21	46.68	502.46	499.55	5.59
13.05	265.08	249.18	56.36	53.15	52.19	46.72	502.49	499.57	5.63
13.55	265.14	249.11	57.03	53.15	52.18	46.67	502.27	499.45	5.61
14.05	265.50	249.37	57.73	53.18	52.17	46.67	503.25	500.64	5.62
14.55	265.92	249.30	58.50	53.16	52.19	46.70	503.75	500.77	5.63
15.05	265.91	248.89	59.34	53.18	52.19	46.68	504.48	500.79	5.65
15.55	265.03	249.99	60.33	53.19	52.18	46.71	503.69	500.44	5.56
16.05	264.29	249.67	61.34	53.20	52.20	46.69	503.67	500.26	5.56
16.55	264.35	249.55	62.40	53.20	52.15	46.72	503.46	500.08	5.59
17.05	264.32	249.67	63.54	53.19	52.12	46.72	503.65	500.06	5.62
17.55	264.27	250.01	64.78	53.19	52.05	46.73	503.81	500.04	5.61
18.05	264.00	250.27	66.12	53.17	52.09	46.73	503.92	500.00	5.61
18.55	263.95	249.66	67.56	53.18	52.08	46.72	504.08	499.97	5.62
19.05	263.90	250.11	69.13	53.18	52.10	46.72	504.16	499.91	5.64
19.55	263.78	250.33	70.87	53.15	52.06	46.73	504.21	499.88	5.57
20.05	263.97	250.68	72.70	53.14	52.05	46.71	504.19	499.79	5.55
20.55	264.17	250.86	74.79	53.12	52.03	46.68	504.17	499.74	5.57
21.05	264.35	250.83	76.97	53.12	52.04	46.68	504.13	499.70	5.61
21.55	264.64	250.44	79.28	53.11	52.04	46.70	504.04	499.63	5.61
22.05	265.03	250.04	81.72	53.11	52.05	46.71	504.30	500.51	5.61

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
22.55	265.55	250.84	84.10	53.12	52.03	46.75	504.81	500.72	5.63
23.05	265.92	249.67	86.49	53.04	51.94	46.66	504.82	500.65	5.66
23.55	266.21	250.50	88.94	53.01	51.96	46.62	504.81	500.51	5.59
24.05	266.43	250.31	91.50	53.03	51.94	46.64	504.87	500.43	5.57
24.55	266.49	249.65	94.12	53.01	51.98	46.65	504.67	500.28	5.60
25.05	266.67	249.90	96.83	53.05	52.01	46.65	504.80	500.25	5.63
25.55	266.67	250.59	99.58	53.04	52.01	46.67	504.69	500.15	5.61
26.05	266.89	250.87	102.42	53.08	52.07	46.67	504.78	500.05	5.62
26.55	266.87	250.93	105.45	53.10	52.11	46.68	504.83	500.04	5.63
27.05	266.80	251.27	108.61	53.12	52.17	46.70	504.89	500.00	5.65
27.55	266.64	251.29	112.08	53.12	52.23	46.70	504.94	499.98	5.58
28.05	266.34	250.81	116.09	53.18	52.25	46.72	504.83	499.88	5.56
28.55	266.23	250.65	120.33	53.18	52.27	46.70	504.95	499.85	5.59
29.05	266.00	250.92	125.41	53.24	52.27	46.76	504.94	499.85	5.63
29.55	265.84	251.24	131.49	53.28	52.29	46.76	504.92	499.79	5.61
30.05	265.69	251.78	138.07	53.32	52.31	46.78	505.01	499.79	5.62
30.55	265.82	251.98	144.86	53.36	52.33	46.78	505.07	499.75	5.63
31.05	265.81	252.04	151.86	53.40	52.37	46.80	505.04	499.71	5.65
31.55	265.88	252.22	159.02	53.46	52.39	46.81	504.90	499.64	5.57
32.05	265.99	252.69	165.60	53.50	52.41	46.81	504.90	499.65	5.57
32.55	266.24	251.92	171.78	53.55	52.43	46.79	504.94	499.59	5.60
33.05	266.60	251.74	177.81	53.63	52.47	46.81	505.35	500.74	5.62
33.55	266.95	251.52	181.32	53.69	52.49	46.83	505.92	500.82	5.62
34.05	267.25	250.62	185.95	53.77	52.49	46.87	506.19	500.83	5.62
34.55	267.38	252.06	191.65	53.84	52.53	46.92	505.98	500.18	5.64
35.05	267.42	252.35	197.43	53.96	52.55	47.00	505.38	499.76	5.64
35.55	267.45	251.16	203.81	54.03	52.59	47.04	505.37	499.65	5.57
36.05	267.63	251.56	207.62	54.17	52.61	47.08	505.06	499.55	5.57
36.55	267.61	251.14	211.88	54.26	52.62	47.15	505.14	499.85	5.61
37.05	267.76	251.72	214.17	54.39	52.66	47.21	505.57	500.22	5.62
37.55	267.89	251.43	216.82	54.51	52.68	47.27	505.82	500.28	5.62
38.05	267.92	251.75	219.66	54.66	52.68	47.26	505.90	500.17	5.63
38.55	267.92	251.56	221.97	54.81	52.72	47.36	506.05	500.17	5.66
39.05	267.76	251.20	224.19	54.96	52.72	47.42	506.20	500.30	5.60
39.55	267.61	251.64	227.07	55.13	52.73	47.47	506.15	500.22	5.57
40.05	267.49	251.89	229.67	55.34	52.71	47.53	505.84	500.18	5.59
40.55	267.32	251.00	231.03	55.55	52.81	47.61	505.86	500.16	5.64
41.05	267.30	251.75	232.51	55.74	52.81	47.62	506.02	500.52	5.63
41.55	267.32	252.75	233.86	55.94	52.84	47.70	506.24	500.59	5.63
42.05	267.21	251.75	234.93	56.19	52.84	47.73	506.11	500.42	5.64
42.55	267.26	251.71	235.68	56.42	52.84	47.79	506.32	500.41	5.63
43.05	267.17	251.46	236.75	56.70	52.88	47.83	506.44	500.46	5.56
43.55	266.99	251.01	237.81	56.98	52.88	47.88	506.34	500.39	5.58
44.05	267.11	251.72	238.00	57.28	52.87	47.96	506.24	500.17	5.63
44.55	267.17	251.86	238.63	57.60	52.91	47.99	506.09	500.19	5.64

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
45.05	267.24	251.38	238.95	57.93	52.91	47.99	506.13	500.05	5.61
45.55	267.23	253.10	239.27	58.26	52.95	48.09	505.94	499.26	5.63
46.05	267.01	252.52	239.61	58.66	52.98	48.10	504.02	499.72	5.67
46.55	267.28	251.30	239.16	58.96	52.96	48.16	504.42	500.70	5.58
47.05	267.77	250.33	238.90	59.24	52.96	48.17	505.47	500.78	5.58
47.55	268.05	251.80	239.30	59.62	52.95	48.21	506.31	501.26	5.61
48.05	268.16	251.40	239.79	60.05	52.99	48.26	506.13	498.55	5.61
48.55	267.99	251.27	240.40	60.54	53.02	48.32	505.10	499.44	5.62
49.05	268.08	250.44	240.34	60.99	53.04	48.33	505.52	499.78	5.63
49.55	268.19	252.52	240.74	61.41	53.02	48.37	506.19	499.95	5.67
50.05	268.29	251.80	241.18	61.91	53.07	48.46	506.45	499.94	5.61
50.55	267.89	251.87	241.45	62.46	53.07	48.49	506.43	499.78	5.58
51.05	267.62	251.70	241.62	62.97	53.08	48.55	506.55	500.28	5.60
51.55	267.74	251.81	241.82	63.51	53.10	48.58	506.85	500.17	5.63
52.05	267.68	252.63	241.96	64.08	53.08	48.62	507.14	500.10	5.62
52.55	267.50	252.32	242.06	64.64	53.13	48.69	507.41	500.07	5.63
53.05	266.92	252.59	242.04	65.24	53.20	48.76	505.57	500.45	5.65
53.55	267.24	251.49	242.11	65.73	53.18	48.80	506.85	500.60	5.63
54.05	267.52	252.47	242.30	66.36	53.19	48.85	507.80	500.62	5.57
54.55	267.43	252.13	242.42	67.00	53.23	48.86	508.06	500.58	5.59
55.05	267.37	253.32	242.45	67.64	53.26	48.92	508.07	500.48	5.63
55.55	267.49	252.40	242.50	68.30	53.29	48.95	507.96	500.32	5.61
56.05	267.54	251.23	242.52	68.95	53.31	49.02	507.94	500.27	5.62
56.55	267.65	251.32	242.55	69.63	53.34	49.05	507.77	500.18	5.63
57.05	267.82	252.07	242.52	70.28	53.37	49.11	507.55	500.00	5.66
57.55	267.87	251.31	242.54	70.99	53.41	49.14	507.57	499.96	5.58
58.05	268.08	252.15	242.55	71.68	53.44	49.19	507.49	499.89	5.58
58.55	268.22	253.08	242.53	72.43	53.47	49.25	507.33	499.82	5.61
59.05	268.42	251.06	242.56	73.18	53.52	49.30	507.38	500.54	5.62
59.55	268.25	250.73	242.50	74.00	53.56	49.33	506.53	500.58	5.63
60.05	268.39	252.72	242.52	74.82	53.59	49.34	506.67	500.40	5.64
60.55	268.38	252.66	242.55	75.64	53.68	49.41	507.18	500.57	5.66
61.05	268.60	252.50	242.63	76.52	53.66	49.41	507.95	500.60	5.60
61.55	268.61	251.50	242.64	77.45	53.71	49.44	507.82	500.50	5.58
62.05	268.50	251.37	242.65	78.42	53.78	49.49	508.04	500.38	5.61
62.55	268.45	251.94	242.69	79.45	53.81	49.49	508.29	500.39	5.64
63.05	268.23	250.73	242.73	80.55	53.86	49.58	508.42	500.33	5.62
63.55	268.01	252.59	242.73	81.67	53.91	49.61	508.59	500.28	5.65
64.05	267.77	251.51	242.78	82.90	53.93	49.64	508.81	500.22	5.67
64.55	267.60	251.63	242.79	84.22	54.01	49.65	509.11	500.21	5.61
65.05	267.56	251.88	242.80	85.65	54.12	49.71	509.24	500.16	5.59
65.55	267.39	251.71	242.81	87.19	54.17	49.74	509.47	500.13	5.62
66.05	267.46	251.78	242.84	88.90	54.26	49.71	509.63	500.09	5.64
66.55	267.41	251.99	242.84	90.85	54.35	49.82	508.91	500.51	5.62
67.05	267.55	252.59	242.78	93.02	54.46	49.87	508.44	500.54	5.64

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
67.55	267.80	252.31	242.79	95.42	54.57	49.88	509.23	500.35	5.67
68.05	268.03	251.89	242.87	98.06	54.62	49.92	509.66	500.34	5.58
68.55	268.24	251.98	242.88	100.91	54.76	49.95	509.79	500.28	5.58
69.05	268.45	253.62	242.88	103.94	54.85	49.96	509.71	500.21	5.62
69.55	268.53	252.68	242.87	107.11	54.98	50.01	509.48	500.14	5.63
70.05	268.67	252.01	242.83	110.37	55.06	50.04	509.23	500.01	5.64
70.55	268.75	253.39	242.80	113.64	55.17	50.05	508.92	499.89	5.64
71.05	268.85	252.72	242.81	116.92	55.30	50.06	509.02	499.79	5.68
71.55	268.94	252.26	242.83	120.20	55.40	50.10	509.01	499.74	5.59
72.05	268.99	251.64	242.84	123.55	55.51	50.11	509.17	499.77	5.58
72.55	268.89	251.19	242.83	127.16	55.62	50.14	509.20	499.97	5.61
73.05	268.66	251.41	242.86	130.83	55.74	50.15	509.58	500.02	5.62
73.55	268.30	251.64	242.80	135.14	55.89	50.16	508.63	500.40	5.63
74.05	268.07	251.97	242.81	139.04	56.00	50.19	509.23	500.27	5.63
74.55	268.06	251.95	242.91	143.67	56.12	50.22	510.15	500.40	5.66
75.05	268.00	252.37	242.99	149.32	56.26	50.23	510.76	500.39	5.60
75.55	267.67	253.05	243.06	155.75	56.37	50.22	511.31	500.34	5.58
76.05	267.81	252.91	243.10	163.05	56.55	50.29	511.70	500.35	5.61
76.55	267.75	253.73	243.13	172.18	56.68	50.30	511.95	500.35	5.64
77.05	267.74	253.87	243.16	182.05	56.82	50.37	512.13	500.30	5.63
77.55	267.60	253.95	243.17	191.28	56.95	50.40	512.27	500.21	5.64
78.05	267.74	253.31	243.16	199.55	57.07	50.43	512.08	500.15	5.67
78.55	267.88	252.82	243.13	206.72	57.27	50.46	511.86	500.04	5.61
79.05	268.03	253.96	243.13	212.61	57.45	50.45	511.67	499.92	5.59
79.55	268.19	254.51	243.08	217.67	57.67	50.52	511.40	499.86	5.62
80.05	268.45	254.56	243.08	221.23	57.89	50.55	511.10	500.68	5.63
80.55	268.59	255.27	243.00	223.53	58.15	50.58	510.37	500.29	5.65
81.05	268.65	255.53	242.97	225.15	58.38	50.61	510.14	500.05	5.66
81.55	268.95	253.49	242.94	225.93	58.60	50.64	509.93	500.51	5.67
82.05	269.08	252.21	242.95	226.90	58.82	50.65	510.21	500.43	5.59
82.55	269.22	251.39	242.98	228.29	59.08	50.68	510.29	500.38	5.58
83.05	269.10	251.51	242.99	229.59	59.28	50.69	510.37	500.34	5.63
83.55	268.97	252.06	243.00	230.64	59.53	50.76	510.53	500.34	5.61
84.05	268.80	253.23	243.01	231.94	59.81	50.75	510.72	500.29	5.63
84.55	268.73	252.85	243.05	233.07	60.09	50.79	510.90	500.29	5.63
85.05	268.44	252.44	243.10	234.37	60.40	50.80	511.32	500.29	5.66
85.55	268.21	252.63	243.14	235.33	60.71	50.87	511.73	500.26	5.58
86.05	267.86	252.21	243.17	236.61	61.10	50.86	512.11	500.25	5.57
86.55	267.74	254.03	243.22	237.52	61.53	50.91	512.62	500.32	5.60
87.05	267.48	255.17	243.26	238.51	61.95	50.92	513.08	500.37	5.63
87.55	267.31	254.75	243.25	239.50	62.43	50.97	512.59	500.51	5.62
88.05	267.37	253.41	243.21	240.16	63.01	51.05	512.44	500.43	5.62
88.55	267.56	253.15	243.25	240.56	63.44	51.04	512.85	500.41	5.66
89.05	267.95	252.89	243.28	240.66	63.94	51.09	512.97	500.41	5.61
89.55	267.99	253.73	243.27	240.97	64.51	51.10	512.75	500.40	5.57

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
90.05	268.34	254.51	243.22	241.14	65.09	51.18	512.37	500.23	5.63
90.55	268.37	253.23	243.18	241.15	65.70	51.21	511.98	500.11	5.65
91.05	268.67	254.15	243.12	241.23	66.38	51.24	511.45	499.98	5.65
91.55	268.86	254.21	243.09	241.26	67.02	51.29	510.97	499.88	5.65
92.05	268.94	252.14	243.02	241.14	67.64	51.30	510.48	500.19	5.69
92.54	268.98	252.29	243.00	241.28	68.35	51.36	510.21	499.77	5.60
93.05	269.14	252.44	242.95	241.37	69.01	51.39	509.79	499.68	5.60
93.55	269.20	252.23	242.91	241.42	69.74	51.44	509.61	499.65	5.65
94.05	269.17	252.08	242.91	241.37	70.44	51.46	509.52	499.64	5.63
94.55	268.91	253.11	242.83	241.47	71.21	51.47	508.67	500.26	5.65
95.05	268.63	251.59	242.80	241.55	71.93	51.50	508.65	500.13	5.68
95.55	268.47	250.49	242.87	241.63	72.63	51.53	509.27	500.24	5.61
96.05	268.45	251.92	242.95	241.67	73.43	51.54	510.08	500.30	5.60
96.54	268.29	255.17	243.06	241.74	74.36	51.58	511.02	500.31	5.62
97.05	268.19	254.34	243.12	241.87	75.44	51.61	511.93	500.36	5.65
97.54	268.14	255.12	243.22	241.97	76.58	51.64	512.61	500.32	5.64
98.05	267.99	254.28	243.28	242.12	77.90	51.67	513.05	500.30	5.67
98.55	267.76	254.56	243.34	242.23	79.29	51.73	513.65	500.39	5.66
99.05	267.88	254.06	243.37	242.33	80.78	51.78	513.79	500.30	5.58
99.55	267.98	254.30	243.40	242.39	82.33	51.86	513.96	500.28	5.62
100.05	268.00	253.93	243.39	242.42	83.96	51.89	513.91	500.18	5.66
100.55	268.44	254.66	243.36	242.41	85.69	51.95	513.63	500.05	5.64
101.05	268.36	253.52	243.34	242.40	87.50	52.02	513.51	500.02	5.66
101.55	266.73	253.76	242.48	241.62	89.92	52.07	513.55	500.57	5.69
102.05	268.45	251.16	242.37	241.66	90.76	52.11	513.78	500.32	5.59
102.55	270.04	252.57	242.49	241.79	91.46	52.19	513.68	500.35	5.60
103.05	271.70	253.03	242.59	241.91	92.44	52.22	513.66	500.30	5.65
103.55	270.87	253.86	242.70	242.06	93.60	52.27	513.72	500.40	5.63
104.05	270.52	252.54	242.80	242.17	95.05	52.31	513.84	500.36	5.65
104.55	270.53	253.68	242.90	242.27	96.69	52.38	513.78	500.39	5.68
105.05	270.57	252.02	242.97	242.31	98.47	52.46	513.71	500.39	5.62
105.55	270.41	253.12	243.05	242.42	100.40	52.56	513.75	500.40	5.60
106.05	270.24	252.35	243.15	242.54	102.41	52.65	513.85	500.40	5.63
106.55	269.74	252.45	243.23	242.65	104.54	52.75	513.61	500.41	5.64
107.05	269.31	252.73	243.34	242.71	106.65	52.87	513.48	500.40	5.63
107.55	268.72	251.98	243.42	242.79	108.84	52.99	514.16	500.39	5.66
108.05	268.32	253.46	243.50	242.89	111.09	53.13	514.95	500.41	5.67
108.55	267.87	253.21	243.58	242.95	113.57	53.27	515.66	500.39	5.59
109.05	267.54	253.09	243.66	243.01	116.41	53.43	516.26	500.27	5.59
109.55	267.42	253.16	243.72	243.09	119.81	53.59	516.77	500.24	5.63
110.05	267.33	254.08	243.67	243.04	124.20	53.79	516.23	500.42	5.64
110.54	267.63	254.01	243.66	243.07	129.32	53.97	516.42	500.20	5.63
111.05	268.03	255.38	243.68	243.07	134.91	54.17	516.45	500.17	5.66
111.55	268.60	253.29	243.65	243.04	140.94	54.32	516.05	500.11	5.66
112.05	268.89	253.98	243.59	243.02	147.28	54.47	515.56	500.02	5.58

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
112.55	269.37	253.55	243.54	242.97	153.71	54.64	514.86	499.93	5.61
113.05	269.38	253.92	243.46	242.89	159.95	54.82	514.07	499.86	5.66
113.55	269.62	252.09	243.38	242.80	165.38	54.96	513.17	499.75	5.64
114.05	269.75	253.20	243.29	242.70	170.11	55.16	512.37	499.67	5.64
114.55	269.90	252.23	243.19	242.65	174.36	55.34	511.61	500.29	5.68
115.05	269.96	251.92	243.13	242.57	178.05	55.51	510.97	499.76	5.61
115.55	270.13	252.05	243.06	242.52	181.29	55.67	510.47	500.11	5.59
116.05	269.92	252.76	243.01	242.48	183.66	55.83	510.16	500.25	5.64
116.55	269.62	252.17	243.02	242.48	186.07	56.03	510.12	500.04	5.63
117.05	269.43	253.04	243.03	242.50	187.87	56.17	510.26	500.02	5.63
117.55	269.00	251.86	243.05	242.55	190.23	56.38	510.67	500.02	5.65
118.04	268.57	253.75	243.11	242.61	193.42	56.64	511.22	500.08	5.67
118.55	268.22	254.09	243.19	242.69	198.01	56.83	511.80	500.11	5.58
119.05	267.88	252.99	243.23	242.73	204.09	57.10	512.37	500.16	5.60
119.55	267.80	253.77	243.29	242.80	210.54	57.38	512.84	500.18	5.65
120.05	267.64	253.68	243.33	242.85	215.75	57.70	513.34	500.20	5.63
120.54	267.81	252.95	243.37	242.89	221.49	58.03	513.59	500.18	5.64
121.05	267.80	252.42	243.40	242.91	227.16	58.42	513.63	500.15	5.67
121.55	267.96	252.93	243.33	242.83	231.93	58.88	512.74	500.27	5.62
122.05	267.90	253.81	243.23	242.74	235.59	59.34	511.94	500.13	5.58
122.55	268.39	255.11	243.16	242.70	236.85	59.78	511.40	499.91	5.60
123.05	268.74	252.87	243.13	242.65	237.70	60.21	510.98	500.02	5.63
123.55	269.25	252.04	243.07	242.60	238.35	60.65	510.51	500.00	5.63
124.05	269.42	251.40	243.02	242.57	238.77	61.09	510.07	499.94	5.63
124.55	269.54	251.76	242.97	242.51	239.14	61.57	509.45	499.82	5.66
125.05	269.70	252.52	242.89	242.44	239.37	62.05	508.75	499.72	5.62
125.55	269.91	252.53	242.82	242.37	239.52	62.55	508.28	499.64	5.57
126.05	269.86	252.46	242.77	242.33	239.60	63.05	507.77	499.57	5.59
126.55	269.78	252.27	242.74	242.28	239.70	63.53	507.44	500.00	5.64
127.05	269.82	252.13	242.70	242.27	239.77	64.01	507.23	499.98	5.61
127.55	269.64	251.94	242.70	242.25	239.96	64.50	507.21	499.95	5.62
128.05	269.36	251.12	242.71	242.24	240.16	65.00	507.29	499.95	5.64
128.55	269.10	252.17	242.75	242.30	240.53	65.57	507.51	499.99	5.63
129.05	268.52	252.55	242.74	242.29	241.14	66.22	507.42	500.20	5.57
129.55	268.06	253.11	242.67	242.24	241.76	66.98	506.99	500.15	5.58
130.05	267.81	252.02	242.69	242.30	241.96	67.70	507.36	500.22	5.63
130.55	267.74	251.22	242.73	242.34	242.12	68.46	507.92	500.21	5.62
131.05	267.66	253.31	242.81	242.42	242.33	69.32	508.51	500.23	5.62
131.55	267.70	253.56	242.87	242.46	242.58	70.27	508.81	500.25	5.62
132.04	268.03	253.77	242.88	242.46	242.79	71.33	508.86	500.19	5.66
132.55	268.15	252.01	242.86	242.45	242.88	72.48	508.55	500.09	5.57
133.05	268.71	252.29	242.82	242.42	242.94	73.63	508.19	499.99	5.56
133.55	268.97	253.84	242.77	242.37	242.93	74.81	507.61	499.87	5.59
134.05	269.35	254.13	242.70	242.31	242.92	76.00	507.06	499.74	5.64
134.55	269.58	252.39	242.63	242.26	242.90	77.09	506.63	500.32	5.59

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
135.05	269.60	252.02	242.60	242.23	242.86	78.11	506.25	500.16	5.62
135.55	269.55	251.02	242.50	242.11	242.79	79.24	505.29	500.41	5.66
136.05	269.74	250.67	242.45	242.08	242.76	80.24	504.94	500.23	5.63
136.55	269.76	250.62	242.42	242.07	242.76	81.09	504.90	500.21	5.59
137.05	269.84	251.00	242.43	242.07	242.77	82.05	504.77	500.30	5.60
137.55	269.86	250.67	242.43	242.08	242.78	82.97	504.88	500.31	5.65
138.05	269.78	252.34	242.44	242.10	242.76	83.95	505.08	500.30	5.62
138.55	269.49	251.72	242.48	242.12	242.84	85.02	505.33	500.34	5.64
139.04	269.14	252.68	242.52	242.17	242.94	86.20	505.70	500.35	5.69
139.55	268.86	253.20	242.56	242.21	242.94	87.46	506.14	500.40	5.61
140.05	268.43	251.36	242.61	242.25	242.98	88.88	506.48	499.91	5.59
140.55	268.25	251.71	242.61	242.27	243.01	90.51	506.42	499.86	5.62
141.05	267.80	253.04	242.62	242.26	243.05	92.26	506.50	499.86	5.62
141.55	267.67	252.33	242.62	242.30	243.05	94.07	506.64	499.89	5.64
142.05	267.69	252.69	242.64	242.28	243.07	95.99	506.67	499.87	5.66
142.55	267.57	252.75	242.56	242.18	242.97	98.15	505.61	500.19	5.67
143.05	267.86	253.69	242.51	242.15	242.98	100.14	505.59	500.08	5.57
143.55	268.41	254.34	242.52	242.19	243.00	102.12	505.59	500.10	5.57
144.05	268.90	252.69	242.47	242.15	242.93	104.35	505.07	500.07	5.66
144.55	269.14	250.89	242.46	242.11	242.94	106.55	504.91	499.97	5.63
145.05	269.62	251.75	242.42	242.10	242.93	108.79	504.65	499.92	5.63
145.55	269.88	253.21	242.37	242.03	242.88	111.04	504.26	499.82	5.65
146.05	269.83	251.10	242.34	242.00	242.85	113.26	503.93	499.71	5.65
146.54	270.17	251.17	242.29	241.97	242.81	115.42	503.50	499.70	5.58
147.05	270.03	250.07	242.28	241.98	242.82	117.39	503.39	499.79	5.60
147.55	270.02	251.97	242.27	241.97	242.81	119.23	503.21	499.66	5.63
148.05	269.94	250.22	242.24	241.93	242.78	120.97	503.15	499.64	5.62
148.55	269.83	251.91	242.23	241.92	242.78	122.69	503.06	499.58	5.64
149.04	269.64	249.74	242.23	241.94	242.78	124.36	503.12	499.60	5.67
149.55	269.32	250.84	242.27	241.96	242.83	126.06	503.29	499.62	5.61
150.05	268.85	251.19	242.22	241.90	242.76	128.09	502.83	500.33	5.59
150.55	268.62	251.91	242.24	241.98	242.82	129.65	503.29	500.32	5.63
151.05	268.19	251.27	242.30	242.00	242.88	131.32	503.73	500.35	5.64
151.55	268.14	251.06	242.36	242.07	242.92	133.09	504.26	500.38	5.64
152.05	267.70	251.53	242.42	242.13	242.99	135.23	504.88	500.20	5.67
152.55	267.63	251.73	242.46	242.16	243.02	137.93	505.02	500.20	5.66
153.05	267.71	251.13	242.46	242.16	243.00	141.09	504.95	500.14	5.59
153.55	267.86	251.03	242.45	242.13	242.97	144.77	504.76	500.08	5.62
154.05	268.19	250.65	242.42	242.12	242.98	148.80	504.47	499.97	5.65
154.55	268.46	251.77	242.37	242.07	242.91	152.98	504.04	499.80	5.64
155.05	268.78	251.47	242.32	242.04	242.90	156.82	503.65	499.91	5.65
155.55	269.38	251.60	242.29	241.99	242.88	160.22	503.32	499.78	5.68
156.05	269.45	251.16	242.26	241.96	242.83	162.86	503.02	499.75	5.59
156.55	269.31	251.11	242.09	241.78	242.66	165.44	501.26	500.06	5.59
157.05	269.92	252.05	242.11	241.82	242.70	166.69	501.79	500.10	5.63

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
157.55	270.46	250.38	242.13	241.84	242.74	167.05	501.96	500.11	5.63
158.05	270.32	250.67	242.08	241.83	242.71	167.38	501.80	500.10	5.62
158.55	270.38	251.79	242.14	241.87	242.73	167.60	502.09	500.14	5.65
159.05	270.28	250.90	242.16	241.88	242.75	167.96	502.17	500.13	5.66
159.55	269.97	250.83	242.15	241.88	242.78	168.42	502.23	500.12	5.59
160.05	269.67	251.98	242.17	241.89	242.78	169.02	502.34	500.17	5.61
160.55	269.37	251.06	242.18	241.91	242.82	169.87	502.65	500.18	5.65
161.05	269.08	251.58	242.22	241.95	242.83	171.08	502.88	500.22	5.65
161.55	268.85	251.89	242.24	241.97	242.88	172.63	503.08	500.22	5.64
162.05	268.44	251.36	242.28	241.99	242.87	174.61	503.31	500.25	5.67
162.55	268.16	251.61	242.28	242.01	242.89	176.97	503.49	500.26	5.60
163.05	267.71	253.11	242.31	242.04	242.99	179.92	503.67	500.26	5.60
163.55	267.82	252.16	242.31	242.06	242.97	183.50	503.63	496.46	5.64
164.04	267.16	253.38	242.10	241.79	242.67	188.20	501.15	499.98	5.63
164.54	267.83	252.19	242.14	241.87	242.84	190.38	502.31	500.18	5.64
165.05	268.21	252.58	242.18	241.91	242.83	192.62	502.37	500.14	5.67
165.55	268.82	252.37	242.20	241.93	242.83	195.56	502.49	500.17	5.64
166.05	269.29	251.86	242.19	241.92	242.85	198.40	502.38	500.11	5.59
166.54	269.67	250.50	242.16	241.89	242.82	200.84	502.12	499.97	5.62
167.04	269.91	250.11	242.13	241.86	242.79	202.90	501.87	499.78	5.64
167.54	270.15	251.33	242.09	241.84	242.78	204.25	501.59	499.61	5.64
168.04	270.30	251.28	242.08	241.81	242.74	205.18	501.35	499.48	5.65
168.55	270.40	251.02	242.08	241.82	242.77	205.33	501.52	500.21	5.67
169.04	270.56	251.11	242.11	241.87	242.79	204.78	501.82	500.30	5.59
169.54	270.50	251.64	242.15	241.90	242.81	204.59	502.03	500.34	5.59
170.05	270.50	251.84	242.15	241.90	242.83	204.98	502.06	500.33	5.64
170.55	270.27	251.52	242.17	241.92	242.84	205.58	502.17	500.37	5.64
171.05	269.60	250.63	242.03	241.78	242.73	209.22	501.31	500.28	5.64
171.55	269.63	249.43	242.15	241.90	242.85	208.29	502.14	500.44	5.66
172.04	269.09	249.86	242.17	241.90	242.85	209.63	502.18	500.43	5.63
172.55	268.60	251.11	242.19	241.94	242.87	211.59	502.49	500.50	5.58
173.05	268.32	252.76	242.23	241.98	242.91	214.03	502.79	500.56	5.59
173.55	267.94	252.89	242.25	241.98	242.93	217.81	502.88	500.53	5.63
174.05	267.75	252.75	242.24	241.95	242.90	222.39	502.76	500.19	5.62
174.54	267.63	253.53	242.20	241.94	242.87	226.10	502.53	499.95	5.64
175.05	267.86	253.65	242.17	241.94	242.89	227.97	502.45	500.01	5.65
175.55	268.07	253.32	242.20	241.93	242.86	228.98	502.42	500.00	5.61
176.05	268.42	253.32	242.18	241.93	242.86	230.05	502.22	499.86	5.58
176.55	268.91	252.88	242.13	241.90	242.85	230.74	501.97	499.67	5.60
177.05	269.49	253.28	242.12	241.89	242.84	230.98	501.91	499.91	5.63
177.55	269.71	254.07	241.96	241.71	242.68	233.24	500.75	500.06	5.63
178.05	270.29	252.48	242.09	241.86	242.81	229.80	501.69	500.16	5.63
178.55	270.82	251.26	242.11	241.88	242.83	231.56	501.71	500.08	5.65
179.05	270.75	251.73	242.10	241.85	242.81	233.03	501.55	500.15	5.62
179.55	270.70	252.81	242.12	241.87	242.82	233.27	501.68	499.67	5.57

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
180.05	270.58	251.74	242.12	241.87	242.82	233.76	501.65	500.23	5.59
180.55	270.35	251.87	242.11	241.88	242.83	234.14	501.68	500.21	5.63
181.05	270.24	251.32	242.11	241.88	242.85	234.34	501.76	500.17	5.63
181.55	269.96	252.61	242.14	241.90	242.85	234.65	501.79	500.07	5.64
182.05	269.64	251.32	242.12	241.87	242.84	234.94	501.83	500.11	5.67
182.54	269.21	252.40	242.14	241.91	242.86	235.16	502.01	500.24	5.62
183.05	268.76	252.17	242.17	241.91	242.88	235.52	502.19	500.28	5.59
183.55	268.22	253.07	242.19	241.94	242.89	236.06	502.34	500.31	5.61
184.05	267.88	253.04	242.19	241.96	242.91	236.74	502.39	500.22	5.65
184.55	267.31	253.91	242.03	241.80	242.75	238.79	501.26	500.00	5.63
185.04	267.57	254.52	242.13	241.87	242.84	239.90	501.95	500.27	5.64
185.55	267.91	253.00	242.15	241.90	242.87	240.57	502.02	500.22	5.67
186.05	268.11	254.91	242.17	241.94	242.92	240.61	502.16	500.34	5.59
186.55	268.59	253.37	242.16	241.92	242.89	240.61	502.11	500.25	5.57
187.05	268.94	252.49	242.14	241.89	242.88	240.55	501.85	500.02	5.61
187.55	269.34	253.02	242.11	241.86	242.83	240.50	501.56	499.82	5.62
188.05	269.61	253.43	242.08	241.84	242.79	240.41	501.30	499.60	5.62
188.55	270.14	252.23	242.04	241.79	242.76	240.36	501.11	499.50	5.64
189.04	270.45	254.28	242.05	241.81	242.78	240.29	500.98	499.45	5.67
189.55	270.58	256.19	242.03	241.80	242.77	240.24	500.95	499.68	5.59
190.04	270.64	254.27	242.07	241.84	242.82	240.08	501.36	500.05	5.59
190.55	270.57	254.69	242.11	241.88	242.87	240.19	501.63	500.19	5.64
191.05	270.50	252.95	242.12	241.88	242.85	240.32	501.62	500.10	5.61
191.55	270.20	252.60	242.01	241.83	242.78	240.13	501.26	500.04	5.62
192.05	270.09	252.01	242.11	241.89	242.84	240.72	501.60	500.10	5.64
192.54	269.70	251.90	242.13	241.89	242.88	241.32	501.82	500.34	5.66
193.05	269.23	252.80	242.13	241.88	242.87	241.50	501.74	500.21	5.57
193.55	269.00	253.76	242.13	241.90	242.87	241.56	501.84	500.27	5.58
194.05	268.42	252.70	242.15	241.92	242.91	241.58	502.05	500.34	5.61
194.55	268.21	252.40	242.16	241.94	242.89	241.60	502.05	500.18	5.61
195.05	267.91	255.46	242.15	241.91	242.86	241.59	501.96	499.98	5.60
195.55	267.91	254.22	242.13	241.90	242.87	241.59	501.86	499.87	5.62
196.05	267.83	255.23	242.13	241.90	242.85	241.63	501.82	499.84	5.66
196.55	267.96	253.55	242.14	241.89	242.85	241.64	501.71	499.78	5.58
197.05	268.37	256.55	242.12	241.85	242.86	241.66	501.62	499.73	5.57
197.55	268.59	253.59	242.09	241.88	242.84	241.68	501.51	499.67	5.60
198.05	269.30	253.65	242.08	241.86	242.83	241.70	501.32	499.45	5.63
198.55	269.25	254.48	241.90	241.70	242.67	241.18	500.63	499.80	5.62
199.05	270.28	253.74	242.06	241.85	242.84	241.31	501.34	499.89	5.63
199.54	270.56	254.81	242.10	241.89	242.86	241.84	501.50	500.10	5.64
200.05	270.78	255.56	242.07	241.84	242.84	241.89	501.31	500.05	5.61
200.54	270.84	254.20	242.09	241.86	242.84	241.93	501.41	500.12	5.56
201.05	270.61	254.49	242.08	241.85	242.83	241.94	501.20	499.91	5.59
201.55	270.47	254.48	242.08	241.85	242.83	241.97	501.30	500.00	5.64
202.05	270.36	252.29	242.08	241.85	242.84	241.98	501.34	500.10	5.62

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
202.54	270.11	252.78	242.09	241.87	242.84	242.00	501.37	500.08	5.63
203.04	269.77	253.52	242.09	241.88	242.86	242.02	501.43	500.10	5.65
203.55	269.50	253.86	242.09	241.88	242.87	242.04	501.44	500.01	5.62
204.05	268.96	254.66	242.13	241.88	242.87	242.10	501.60	500.13	5.58
204.55	268.55	256.76	242.14	241.90	242.89	242.12	501.64	500.09	5.59
205.05	268.25	254.79	242.14	241.93	242.89	242.12	501.74	500.09	5.63
205.54	268.09	252.91	242.13	241.89	242.90	242.16	501.63	499.82	5.61
206.05	267.64	254.56	242.02	241.79	242.79	241.81	501.16	499.91	5.62
206.55	267.91	253.33	242.11	241.90	242.87	242.17	501.75	500.18	5.65
207.05	267.92	256.54	242.12	241.90	242.89	242.26	501.71	500.16	5.62
207.55	268.39	255.29	242.12	241.91	242.89	242.26	501.62	500.04	5.58
208.04	268.76	257.38	242.11	241.86	242.86	242.29	501.37	499.80	5.59
208.55	269.17	257.51	242.07	241.84	242.83	242.27	501.12	499.63	5.64
209.04	269.79	256.15	242.04	241.83	242.81	242.29	500.92	499.51	5.62
209.55	270.01	256.15	242.03	241.80	242.80	242.28	500.83	499.33	5.62
210.05	270.30	256.26	242.01	241.80	242.78	242.30	500.72	499.24	5.66
210.55	270.96	254.68	242.00	241.78	242.79	242.30	500.56	499.16	5.62
211.05	270.85	254.54	242.05	241.82	242.84	242.36	501.20	500.11	5.58
211.55	270.75	256.23	242.09	241.88	242.88	242.40	501.50	500.25	5.61
212.04	270.66	254.71	242.10	241.86	242.89	242.40	501.33	500.14	5.65
212.55	270.43	254.77	242.07	241.83	242.85	242.33	501.16	499.79	5.62
213.05	270.23	254.75	242.07	241.85	242.84	242.36	501.11	499.90	5.64
213.55	269.71	256.07	241.98	241.77	242.79	241.87	501.01	500.07	5.67
214.05	269.68	256.00	242.07	241.84	242.86	242.24	501.27	499.80	5.59
214.55	269.18	254.40	242.10	241.88	242.88	242.45	501.51	500.25	5.57
215.05	268.82	254.44	242.15	241.94	242.94	242.49	501.86	500.42	5.62
215.55	268.39	254.73	242.12	241.91	242.95	242.53	501.68	500.26	5.64
216.05	268.20	255.74	242.12	241.89	242.88	242.50	501.52	499.91	5.63
216.55	267.68	255.89	242.11	241.88	242.86	242.49	501.46	499.92	5.65
217.04	267.77	257.81	242.09	241.86	242.85	242.44	501.40	499.75	5.67
217.55	268.02	257.78	242.10	241.86	242.87	242.49	501.33	499.76	5.58
218.05	268.37	259.35	242.08	241.87	242.85	242.49	501.32	499.73	5.58
218.55	268.63	259.08	242.07	241.85	242.86	242.50	501.20	499.73	5.63
219.05	268.97	258.64	242.09	241.87	242.86	242.54	501.31	499.90	5.62
219.55	269.82	257.86	242.09	241.88	242.88	242.54	501.30	499.87	5.63
220.05	269.97	258.10	242.08	241.88	242.87	242.54	501.28	499.84	5.65
220.55	270.21	257.44	241.97	241.77	242.78	242.06	501.14	500.14	5.64
221.04	270.95	257.71	242.08	241.87	242.82	242.42	501.34	499.95	5.57
221.54	271.07	257.32	242.12	241.92	242.91	242.59	501.62	500.29	5.59
222.05	270.82	255.85	242.14	241.91	242.91	242.61	501.61	500.30	5.63
222.55	270.60	255.75	242.09	241.88	242.85	242.58	501.18	499.74	5.62
223.05	270.50	256.25	242.06	241.83	242.83	242.53	500.91	499.63	5.63
223.54	270.19	257.28	242.06	241.83	242.85	242.55	501.05	499.97	5.65
224.05	270.03	257.46	242.12	241.89	242.89	242.60	501.52	500.36	5.63
224.55	269.66	257.19	242.12	241.91	242.89	242.61	501.46	500.23	5.58

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
225.05	269.12	257.63	242.09	241.87	242.90	242.59	501.30	499.88	5.60
225.55	268.67	258.30	242.11	241.88	242.86	242.59	501.28	499.86	5.65
226.04	268.36	257.67	242.09	241.86	242.87	242.60	501.25	499.82	5.64
226.55	268.26	257.37	242.10	241.86	242.89	242.62	501.35	499.90	5.64
227.05	267.97	257.48	242.12	241.89	242.87	242.60	501.40	499.83	5.69
227.55	267.83	259.31	242.07	241.87	242.87	242.25	501.52	500.03	5.59
228.04	268.20	258.27	242.10	241.87	242.91	242.59	501.71	500.23	5.59
228.54	268.50	257.76	242.14	241.93	242.88	242.66	501.71	500.11	5.65
229.05	268.63	259.02	242.11	241.88	242.90	242.65	501.46	499.97	5.63
229.55	269.31	259.45	242.08	241.88	242.87	242.62	501.17	499.63	5.64
230.05	269.40	258.36	242.05	241.85	242.83	242.60	500.94	499.46	5.66
230.54	269.74	258.04	242.05	241.85	242.85	242.60	500.87	499.58	5.62
231.05	270.27	256.84	242.09	241.91	242.89	242.64	501.42	500.42	5.58
231.55	270.87	256.80	242.16	241.95	242.95	242.72	501.79	500.52	5.61
232.05	270.96	256.61	242.13	241.91	242.94	242.70	501.52	500.22	5.64
232.55	270.68	257.20	242.10	241.88	242.88	242.67	501.14	499.85	5.63
233.05	270.57	256.76	242.06	241.87	242.89	242.64	500.99	499.78	5.65
233.55	270.47	256.46	242.07	241.87	242.85	242.62	500.99	499.86	5.68
234.05	270.40	257.02	242.09	241.89	242.88	242.37	501.48	500.26	5.59
234.55	270.06	255.58	242.12	241.91	242.91	242.64	501.49	500.21	5.60
235.05	269.84	256.03	242.16	241.97	242.95	242.72	501.93	498.58	5.66
235.54	269.32	256.21	242.15	241.91	242.95	242.72	501.88	500.63	5.65
236.05	269.02	256.92	242.17	241.93	242.96	242.74	501.90	500.47	5.65
236.54	268.48	257.78	242.13	241.92	242.92	242.69	501.55	499.99	5.69
237.05	268.08	258.36	242.12	241.90	242.89	242.67	501.38	499.90	5.60
237.55	267.90	258.27	242.12	241.89	242.93	242.70	501.52	500.08	5.61
238.04	267.87	258.56	242.14	241.91	242.93	242.70	501.65	500.16	5.67
238.55	268.13	258.78	242.14	241.93	242.93	242.72	501.67	500.16	5.65
239.04	268.27	260.28	242.13	241.91	242.92	242.70	501.54	499.92	5.66
239.54	268.60	259.11	242.11	241.92	242.92	242.71	501.48	499.96	5.68
240.05	269.16	259.38	242.10	241.87	242.89	242.69	501.30	499.83	5.61
240.55	269.31	258.72	242.08	241.89	242.91	242.69	501.28	499.80	5.60
241.05	269.93	258.13	242.09	241.85	242.86	242.66	501.08	499.67	5.64
241.54	270.00	258.45	242.00	241.80	242.82	242.36	501.02	499.90	5.64
242.05	270.75	258.94	242.04	241.80	242.84	242.61	500.69	499.60	5.65
242.54	270.82	258.93	242.02	241.82	242.83	242.63	500.57	499.56	5.69
243.05	271.00	258.07	242.11	241.90	242.92	242.71	501.39	500.25	5.61
243.55	271.33	258.18	242.15	241.94	242.96	242.76	501.77	500.53	5.59
244.05	270.83	258.29	242.14	241.90	242.93	242.75	501.28	499.95	5.65
244.55	270.49	258.49	242.05	241.84	242.87	242.68	500.81	499.56	5.65
245.05	270.22	257.47	242.05	241.84	242.88	242.66	500.90	499.88	5.65
245.54	270.06	257.85	242.15	241.95	242.97	242.77	501.90	500.75	5.68
246.05	269.68	258.84	242.22	242.00	243.01	242.83	502.32	501.08	5.61
246.54	269.07	258.54	242.19	241.97	242.99	242.80	501.79	500.33	5.61
247.05	268.68	258.59	242.13	241.92	242.94	242.74	501.58	500.06	5.66

Table B6. Continued.

Time min	T1 ºC	T2 ºC	T3 ºC	T4 ºC	T5 ºC	T6 ºC	$P_{injection}$ psig	P_{out} psig	V_w cc/min
247.55	268.23	258.81	242.15	241.94	242.96	242.76	501.83	500.41	5.65
248.05	268.12	259.10	242.18	241.96	242.98	242.82	501.96	500.44	5.65
248.55	267.76	258.71	242.11	241.89	242.88	242.59	501.54	500.55	5.69
249.04	268.11	259.03	242.18	241.96	242.97	242.74	502.07	500.56	5.61
249.54	268.38	259.54	242.22	242.02	243.02	242.84	502.43	501.00	5.60
250.05	268.85	259.72	242.22	241.97	242.99	242.78	502.08	500.64	5.64
250.55	268.91	260.12	242.17	241.93	242.96	242.80	501.79	500.43	5.63
251.05	269.49	260.96	242.13	241.92	242.94	242.73	501.55	500.24	5.64
251.55	269.89	261.20	242.14	241.91	242.93	242.75	501.52	500.26	5.66
252.05	270.41	261.04	242.12	241.91	242.91	242.75	501.48	500.18	5.63
252.55	270.87	259.89	242.09	241.89	242.89	242.75	501.25	500.02	5.58
253.04	271.01	259.16	242.09	241.87	242.91	242.73	501.13	500.01	5.61
253.55	271.29	258.24	242.09	241.90	242.90	242.74	501.17	500.14	5.64
254.05	271.00	258.48	242.11	241.91	242.92	242.79	501.36	500.30	5.62
254.54	271.04	258.16	242.11	241.92	242.92	242.76	501.40	500.38	5.66
255.05	270.86	258.03	242.12	241.92	242.94	242.76	501.39	500.35	5.68
255.55	270.74	257.57	242.10	241.91	242.93	242.19	501.58	500.35	5.59
256.04	270.34	257.72	242.14	241.92	242.95	242.71	501.60	500.50	5.60
256.55	269.80	258.40	242.20	241.98	243.00	242.81	502.00	500.71	5.64
257.04	269.28	259.10	242.20	241.98	242.99	242.84	502.03	500.86	5.62

APPENDIX C

PRODUCTION DATA

Table C1. Production data for Run 1.

Time min	Vpore (CWE)	Sample No.	Vtotal cm3	Vwater cm3	Voil cm3	Cum. cm3	Cum. cm3	Water cm3/min	Oil Rate cm3/min	Recovery %
0	0	0	0	0	0	0	0	0	0	0
36	0.18	0	0	0	0	0	0	0	0	0
43	0.21	W1	51	51	0	51	0	7.29	0	0
50	0.25	W2	49	49	0	100	0	7.00	0	0
57	0.28	W3	57	57	0	157	0	8.14	0	0
64	0.32	W4	45	45	0	202	0	6.43	0	0
71	0.35	W5	50	50	0	252	0	7.14	0	0
78	0.39	W6	40	40	0	292	0	5.71	0	0
85	0.42	W7	56	56	0	348	0	8.00	0	0
92	0.46	W8	55	55	0	403	0	7.86	0	0
99	0.49	W9	57	57	0	460	0	8.14	0	0
106	0.53	W10	44	44	0	504	0	6.29	0	0
113	0.56	W11	60	60	0	564	0	8.57	0	0
120	0.60	W12	40	40	0	604	0	5.71	0	0
127	0.63	W13	63	63	0	667	0	9.00	0	0
134	0.67	W14	41	41	0	708	0	5.86	0	0
141	0.70	1,2	51	50	1	758	1	7.14	0.14	0.2
148	0.74	3	38	35	3	793	4	5.00	0.43	1.0
155	0.77	4,5	53	41	12	834	16	5.86	1.71	3.9
162	0.81	6	42	32	10	866	26	4.57	1.43	6.3
169	0.84	7,8	57	41	16	907	42	5.86	2.29	10.2
176	0.88	9,10	54	46	8	953	50	6.57	1.14	12.1
183	0.91	11	47	38	9	991	59	5.43	1.29	14.3
190	0.95	12,13	58	47	11	1038	70	6.71	1.57	17.0
197	0.98	14,15	46	36	10	1074	80	5.14	1.43	19.4
204	1.02	16,17	57	50	7	1124	87	7.14	1.00	21.1
211	1.05	18	36	30	6	1154	93	4.29	0.86	22.5
218	1.09	19,20	60	53	7	1207	100	7.57	1.00	24.2
225	1.12	21	40	35	5	1242	105	5.00	0.71	25.4
232	1.16	22	46	43	3	1285	108	6.14	0.43	26.2
239	1.19	23	38	35	3	1320	111	5.00	0.43	26.9
246	1.23	24,25	55	50	5	1370	116	7.14	0.71	28.1
253	1.26	26	34	32	2	1402	118	4.57	0.29	28.6
260	1.30	27,28	52	48	4	1450	122	6.86	0.57	29.6
267	1.33	29	35	33	2	1483	124	4.71	0.29	30.1
274	1.36	30,31	52	49	3	1532	127	7.00	0.43	30.8
281	1.40	32	38	36	2	1568	129	5.14	0.29	31.3
288	1.43	33	45	43	2	1611	131	6.14	0.29	31.7

Table C2. Production data for Run 2.

Time min	Vpore (CWE)	Sample No.	Vtotal cm3	Vwater cm3	Voil cm3	Cum. cm3	Cum. cm3	Water cm3/min	Oil Rate cm3/min	Recovery %
0	0	0	0	0	0	0	0	0	0	0
39	0.20	0	0	0	0	0	0	0	0	0
46	0.23	W1	59	59	0	59	0	8.43	0	0
53	0.27	W2	45	45	0	104	0	6.43	0	0
60	0.30	W3	53	53	0	157	0	7.57	0	0
67	0.34	W4	54	54	0	211	0	7.71	0	0
74	0.37	W5	55	55	0	266	0	7.86	0	0
81	0.41	W6	46	46	0	312	0	6.57	0	0
88	0.44	W7	54	54	0	366	0	7.71	0	0
95	0.48	W8	51	51	0	417	0	7.29	0	0
102	0.51	W9	52	52	0	469	0	7.43	0	0
109	0.55	W10	55	55	0	524	0	7.86	0	0
116	0.58	W11	45	45	0	569	0	6.43	0	0
123	0.62	W12	47	47	0	616	0	6.71	0	0
130	0.65	1,2	47	38	9	654	9	5.43	1.29	2.1
137	0.69	3,4	57	39	18	693	27	5.57	2.57	6.2
144	0.72	5,6	53	36	17	729	44	5.14	2.43	10.1
151	0.76	7,8	56	39	17	768	61	5.57	2.43	13.9
158	0.79	9,10	54	40	14	808	75	5.71	2.00	17.1
165	0.83	11,12	51	37	14	845	89	5.29	2.00	20.3
172	0.86	13,14	54	41	13	886	102	5.86	1.86	23.3
179	0.90	15,16	51	37	14	923	116	5.29	2.00	26.5
186	0.93	17,18	47	37	10	960	126	5.29	1.43	28.8
193	0.97	19,20	53	44	9	1004	135	6.29	1.29	30.8
200	1.00	21,22	50	38	12	1042	147	5.43	1.71	33.6
207	1.04	23,24	47	39	8	1081	155	5.57	1.14	35.4
214	1.07	25,26	54	44	10	1125	165	6.29	1.43	37.7
221	1.11	27	47	42	5	1167	170	6.00	0.71	38.8
228	1.15	28	42	36	6	1203	176	5.14	0.86	40.2
235	1.18	29	48	44	4	1247	180	6.29	0.57	41.1
242	1.22	30	49	44	5	1291	185	6.29	0.71	42.3
249	1.25	31	41	37	4	1328	189	5.29	0.57	43.2
256	1.29	32	39	35	4	1363	193	5.00	0.57	44.1

Table C3. Production data for Run 3.

Time min	Vpore (CWE)	Sample No.	Vtotal cm3	Vwater cm3	Voil cm3	Cum. cm3	Cum. cm3	Water cm3/min	Oil Rate cm3/min	Recovery %
0	0	0	0	0	0	0	0	0	0	0
38	0.19	0	0	0	0	0	0	0	0	0
45	0.23	W1	43	43	0	43	0	6.14	0	0
52	0.26	W2	54	54	0	97	0	7.71	0	0
59	0.30	W3	50	50	0	147	0	7.14	0	0
66	0.33	W4	52	52	0	199	0	7.43	0	0
73	0.37	W5	48	48	0	247	0	6.86	0	0
80	0.40	W6	57	57	0	304	0	8.14	0	0
87	0.44	W7	52	52	0	356	0	7.43	0	0
94	0.47	W8	49	49	0	405	0	7.00	0	0
101	0.51	W9	52	52	0	457	0	7.43	0	0
108	0.54	W10	52	52	0	509	0	7.43	0	0
115	0.58	W11	51	51	0	560	0	7.29	0	0
122	0.61	W12	43	43	0	603	0	6.14	0	0
129	0.65	1,2	54	44	10	647	10	6.29	1.43	2.4
136	0.68	3,4	55	41	14	688	24	5.86	2.00	5.7
143	0.72	5,6	53	39	14	727	38	5.57	2.00	9.0
150	0.76	7,8	57	40	17	767	55	5.71	2.43	13.0
157	0.79	9,10	54	41	13	808	68	5.86	1.86	16.1
164	0.83	11,12	50	38	12	846	80	5.43	1.71	18.9
171	0.86	13,14	54	41	13	887	93	5.86	1.86	22.0
178	0.90	15,16	53	41	12	928	105	5.86	1.71	24.8
185	0.93	17,18	54	41	13	969	118	5.86	1.86	27.9
192	0.97	19,20	54	42	12	1011	130	6.00	1.71	30.7
199	1.00	21,22	52	41	11	1052	141	5.86	1.57	33.3
206	1.04	23,24	50	42	8	1094	149	6.00	1.14	35.2
213	1.07	25,26	54	45	9	1139	158	6.43	1.29	37.4
220	1.11	27	44	38	6	1177	164	5.43	0.86	38.8
227	1.14	28	46	39	7	1216	171	5.57	1.00	40.4
234	1.18	29	47	43	4	1259	175	6.14	0.57	41.4
241	1.21	30	45	41	4	1300	179	5.86	0.57	42.3
248	1.25	31	46	43	3	1343	182	6.14	0.43	43.0
255	1.28	32	45	43	2	1386	184	6.14	0.29	43.5

Table C4. Production data for Run 4.

Time min	Vpore (CWE)	Sample No.	Vtotal cm3	Vwater cm3	Voil cm3	Cum. cm3	Cum. cm3	Water cm3/min	Oil Rate cm3/min	Recovery %
0	0.0	0	0	0	0	0	0	0	0	0
31	0.16	0	0	0	0	0	0	0	0	0
38	0.19	W1	54	54	0	54	0	7.71	0	0
45	0.23	W2	55	55	0	109	0	7.86	0	0
52	0.26	W3	56	56	0	165	0	8.00	0	0
59	0.30	W4	50	50	0	215	0	7.14	0	0
66	0.33	W5	54	54	0	269	0	7.71	0	0
73	0.37	1	46	45	1	314	1	6.43	0.14	0.2
80	0.40	2,3	58	36	22	350	23	5.14	3.14	4.8
87	0.44	4,5	60	38	22	388	45	5.43	3.14	9.4
94	0.47	6,7	63	42	21	430	66	6.00	3.00	13.8
101	0.51	8,9	60	44	16	474	82	6.29	2.29	17.2
108	0.55	10,11	58	42	16	516	98	6.00	2.29	20.5
115	0.58	12,13	60	42	18	558	116	6.00	2.57	24.3
122	0.62	14,15	59	42	17	600	133	6.00	2.43	27.9
129	0.65	16,17	59	41	18	641	151	5.86	2.57	31.6
136	0.69	18,19	55	38	17	679	168	5.43	2.43	35.2
143	0.72	20,21	58	42	16	721	184	6.00	2.29	38.5
150	0.76	22,23	57	41	16	762	200	5.86	2.29	41.9
157	0.79	24,25	56	40	16	802	216	5.71	2.29	45.2
164	0.83	26,27	53	37	16	839	232	5.29	2.29	48.6
171	0.86	28,29	54	43	11	882	243	6.14	1.57	50.9
178	0.90	30,31	58	43	15	925	258	6.14	2.14	54.0
185	0.93	32	45	35	10	960	268	5.00	1.43	56.1
192	0.97	33,34	53	44	9	1004	277	6.29	1.29	58.0
199	1.00	35,36	55	46	9	1050	286	6.57	1.29	59.9
206	1.04	37	38	34	4	1084	290	4.86	0.57	60.7
213	1.08	38	43	38	5	1122	295	5.43	0.71	61.8
220	1.11	39	42	39	3	1161	298	5.57	0.43	62.4
227	1.15	40	49	43	6	1204	304	6.14	0.86	63.7
234	1.18	41	45	41	4	1245	308	5.86	0.57	64.5
241	1.22	42	45	40	5	1285	313	5.71	0.71	65.6
248	1.25	43	41	38	3	1323	316	5.43	0.43	66.2
255	1.29	44	44	40	4	1363	320	5.71	0.57	67.03

Table C5. Production data for Run 5.

Time min	Vpore (CWE)	Sample No.	Vtotal cm3	Vwater cm3	Voil cm3	Cum. cm3	Cum. cm3	Water cm3/min	Oil Rate cm3/min	Recovery %
0	0	0	0	0	0	0	0	0	0	0
39	0.20	0	0	0	0	0	0	0	0	0
46	0.23	W1	54	54	0	54	0	7.71	0	0
53	0.27	W2	45	45	0	99	0	6.43	0	0
60	0.30	W3	49	49	0	148	0	7.00	0	0
67	0.34	W4	53	53	0	201	0	7.57	0	0
74	0.37	W5	49	49	0	250	0	7.00	0	0
81	0.41	W6	48	48	0	298	0	6.86	0	0
88	0.44	W7	50	50	0	348	0	7.14	0	0
95	0.48	W8	51	51	0	399	0	7.29	0	0
102	0.51	W9	51	51	0	450	0	7.29	0	0
109	0.55	W10	48	48	0	498	0	6.86	0	0
116	0.58	W11	49	49	0	547	0	7.00	0	0
123	0.62	W12	53	53	0	600	0	7.57	0	0
130	0.65	1	44	44	0	644	0	6.29	0	0
137	0.69	2,3	40	35	5	679	5	5.71	0.71	1.2
144	0.72	4,5	57	38	19	717	24	8.14	2.71	5.5
151	0.76	6,7	57	41	16	758	40	8.14	2.29	9.2
158	0.79	8,9	52	38	14	796	54	7.43	2.00	12.4
165	0.83	10,11	51	35	16	831	70	7.29	2.29	16.1
172	0.86	12,13	57	41	16	872	86	8.14	2.29	19.8
179	0.90	14,15	56	42	14	914	100	8.00	2.00	23.0
186	0.93	16,17	51	37	14	951	114	7.29	2.00	26.2
193	0.97	18,19	50	41	9	992	123	7.14	1.29	28.3
200	1.00	20,21	59	48	11	1040	134	8.43	1.57	30.8
207	1.04	22,23	47	41	6	1081	140	6.71	0.86	32.2
214	1.07	24,25	49	39	10	1120	150	7.00	1.43	34.5
221	1.11	26,27	55	44	11	1164	161	7.86	1.57	37.0
228	1.14	28,29	51	44	7	1208	168	7.29	1.00	38.6
235	1.18	30	42	38	4	1246	172	6.00	0.57	39.6
242	1.21	31	46	41	5	1287	177	6.57	0.71	40.7
249	1.25	32	46	43	3	1330	180	6.57	0.43	41.4
256	1.28	33	41	37	4	1367	184	5.86	0.57	42.3

Table C6. Production data for Run 6.

Time min	Vpore (CWE)	Sample No.	Vtotal cm3	Vwater cm3	Voil cm3	Cum. cm3	Cum. cm3	Water cm3/min	Oil Rate cm3/min	Recovery %
0	0	0	0	0	0	0	0	0	0	0
39	0.20	0	0	0	0	0	0	0	0	0
46	0.23	W1	47	47	0	47	0	6.71	0	0
53	0.27	W2	48	48	0	95	0	6.86	0	0
60	0.30	W3	55	55	0	150	0	7.86	0	0
67	0.34	W4	54	54	0	204	0	7.71	0	0
74	0.37	W5	48	48	0	252	0	6.86	0	0
81	0.41	W6	55	55	0	307	0	7.86	0	0
88	0.44	W7	48	48	0	355	0	6.86	0	0
95	0.48	W8	55	55	0	410	0	7.86	0	0
102	0.52	W9	47	47	0	457	0	6.71	0	0
109	0.55	W10	48	48	0	505	0	6.86	0	0
116	0.59	1,2	44	37	7	542	7	5.29	1.00	1.6
123	0.62	3,4	60	39	21	581	28	5.57	3.00	6.5
130	0.66	5,6	57	38	19	619	47	5.43	2.71	11.0
137	0.69	7,8	61	42	19	661	66	6.00	2.71	15.4
144	0.73	9,10	60	43	17	704	83	6.14	2.43	19.4
151	0.76	11,12	51	36	15	740	98	5.14	2.14	22.9
158	0.80	13,14	58	43	15	783	113	6.14	2.14	26.4
165	0.83	15,16	56	41	15	824	128	5.86	2.14	29.9
172	0.87	17	43	33	10	857	138	4.71	1.43	32.2
179	0.90	18,19	62	48	14	905	152	6.86	2.00	35.5
186	0.94	20,21	51	42	9	947	161	6.00	1.29	37.5
193	0.98	22,23	48	42	6	989	167	6.00	0.86	38.9
200	1.01	24,25	58	48	10	1037	177	6.86	1.43	41.3
207	1.05	26,27	49	42	7	1079	184	6.00	1.00	42.9
214	1.08	28,29	51	45	6	1124	190	6.43	0.86	44.3
221	1.12	30,31	50	45	5	1169	195	6.43	0.71	45.5
228	1.15	32	40	38	2	1207	197	5.43	0.29	45.9
235	1.19	33	43	40	3	1247	200	5.71	0.43	46.6
242	1.22	34,35	53	48	5	1295	205	6.86	0.71	47.8
249	1.26	36	40	38	2	1333	207	5.43	0.29	48.3
256	1.29	37	41	38	3	1371	210	5.43	0.43	49.0

APPENDIX D

OIL SAMPLE PROPERTY DATA

Table D1. Density & API gravity for all runs.

		Density g/cc	°API	Remarks
Initial	Original	0.9826	12.37	
	5% Tetralin	0.9821	12.43	
RUN 1	Sample 1	0.9717	13.97	Base
	Sample 2	0.9523	16.94	
RUN 2	Sample 1	0.9769	13.2	5% Injection
	Sample 2	0.9654	14.93	
RUN 3	Sample 1	0.9764	13.28	5% Premix
	Sample 2	0.9663	14.79	
RUN 4	Sample 1	0.9788	12.93	15% Injection
	Sample 2	0.9707	14.12	
RUN 5	Sample 1	0.9768	13.21	5% Injection
	Sample 2	0.9644	15.08	
RUN 6	Sample 1	0.9734	13.73	5% Premix
	Sample 2	0.9619	15.46	

Table D2. Elemental analysis data for all runs.

		V, ppm	Ni, ppm	H/C ratio	Remarks
Initial	Original	257.0	86.6	1.62	
	5% Tetralin	244.1	82.3	1.56	
RUN 1	Sample 1	228.7	77.7	1.59	Base
	Sample 2	197.5	66.7	1.58	
RUN 2	Sample 1	195.1	63.6	1.59	5% Injection
	Sample 2	186.2	68.8	1.67	
RUN 3	Sample 1	199.4	64.9	1.64	5% Premix
	Sample 2	172.0	57.2	1.63	
RUN 4	Sample 1	182.2	59.7	1.54	15% Injection
	Sample 2	157.1	50.8	1.58	
RUN 5	Sample 1	208.8	67.3	1.61	5% Injection
	Sample 2	171.6	54.4	1.61	
RUN 6	Sample 1	173.3	56.3	1.68	5% Premix
	Sample 2	162.0	53.3	1.67	

Table D3. Viscosity data for all runs.

		Viscosity, cp			Remarks
Initial	Original	7832	3071	1434	
	5% Tetralin	2869	1303	694	
RUN 1	Sample 1	1490	792	473	Base
	Sample 2	243	134	96	
RUN 2	Sample 1	829	475	278	5% Injection
	Sample 2	232	156	92	
RUN 3	Sample 1	932	573	311	5% Premix
	Sample 2	263	176	99	
RUN 4	Sample 1	181	122	78	15% Injection
	Sample 2	111	76	54	
RUN 5	Sample 1	988	519	305	5% Injection
	Sample 2	271	163	104	
RUN 6	Sample 1	651	362	226	5% Premix
	Sample 2	172	102	70	

Table D4. Liquid Composition data for runs 1 & 2.

	Initial		Run 1		Run 2	
	Original	5% Tetralin	Sample 1	Sample 2	Sample 1	Sample 2
Component	Wt%	Wt%	Wt%	Wt%	Wt%	Wt%
ethane	0.00	0.00	0.00	0.00	0.00	0.00
propane	0.00	0.00	0.00	0.00	0.00	0.00
i-butane	0.00	0.00	0.00	0.00	0.00	0.00
n-butane	0.00	0.00	0.00	0.00	0.00	0.00
i-pentane	0.01	0.01	0.00	0.00	0.00	0.00
n-pentane	0.01	0.01	0.00	0.00	0.00	0.00
C6-group	0.04	0.01	0.01	0.01	0.02	0.00
C7-group	0.27	0.27	0.17	0.13	0.14	0.14
C8-group	0.36	0.41	0.53	0.50	0.25	0.35
C9-group	0.67	0.53	1.01	1.25	0.45	0.63
C10-group	0.78	0.91	1.96	2.90	0.88	1.24
C11-group	1.24	1.35	2.77	4.50	1.51	2.05
C12-group	1.96	9.20	3.90	6.36	32.68	31.74
C13-group	2.55	2.03	3.63	5.76	2.05	2.65
C14-group	2.98	2.86	4.51	6.94	2.84	3.51
C15-group	3.12	3.76	5.54	8.08	3.48	4.26
C16-group	3.71	2.65	3.52	4.70	2.36	2.70
C17-group	4.11	3.65	4.41	5.36	3.13	3.38
C18-group	3.81	3.26	3.64	3.92	2.70	2.75
C19-group	2.89	2.87	3.04	2.99	2.34	2.67
C20+	71.50	66.22	61.38	46.59	45.16	41.96

Table D5. Liquid Composition data for runs 3 & 4.

	Initial		Run 3		Run 4	
	Original	5% Tetralin	Sample 1	Sample 2	Sample 1	Sample 2
Component	Wt%	Wt%	Wt%	Wt%	Wt%	Wt%
ethane	0.00	0.00	0.00	0.00	0.00	0.00
propane	0.00	0.00	0.00	0.00	0.00	0.00
i-butane	0.00	0.00	0.00	0.00	0.00	0.00
n-butane	0.00	0.00	0.00	0.00	0.00	0.00
i-pentane	0.01	0.01	0.00	0.00	0.00	0.01
n-pentane	0.01	0.01	0.00	0.00	0.00	0.00
C6-group	0.04	0.01	0.02	0.01	0.01	0.01
C7-group	0.27	0.27	0.07	0.10	0.13	0.08
C8-group	0.36	0.41	0.22	0.35	0.24	0.26
C9-group	0.67	0.53	0.54	0.86	0.69	0.64
C10-group	0.78	0.91	0.93	1.93	0.90	1.50
C11-group	1.24	1.35	1.97	3.14	1.50	2.53
C12-group	1.96	9.20	10.84	21.41	9.00	16.53
C13-group	2.55	2.03	2.83	4.17	2.62	3.33
C14-group	2.98	2.86	3.60	5.09	2.82	4.09
C15-group	3.12	3.76	3.54	5.72	2.69	4.79
C16-group	3.71	2.65	2.62	3.38	2.98	2.89
C17-group	4.11	3.65	3.28	4.03	3.03	3.47
C18-group	3.81	3.26	3.82	3.18	2.66	2.71
C19-group	2.89	2.87	2.70	3.06	1.93	2.58
C20+	71.50	66.22	63.03	43.57	68.80	54.58

Table D6. Liquid Composition data for runs 5 & 6.

	Initial		Run 5		Run 6	
	Original	5% Tetralin	Sample 1	Sample 2	Sample 1	Sample 2
Component	Wt%	Wt%	Wt%	Wt%	Wt%	Wt%
ethane	0.00	0.00	0.00	0.00	0.00	0.00
propane	0.00	0.00	0.00	0.00	0.00	0.00
i-butane	0.00	0.00	0.00	0.00	0.00	0.00
n-butane	0.00	0.00	0.00	0.00	0.00	0.00
i-pentane	0.01	0.01	0.00	0.00	0.00	0.01
n-pentane	0.01	0.01	0.00	0.00	0.00	0.00
C6-group	0.04	0.01	0.02	0.01	0.02	0.00
C7-group	0.27	0.27	0.10	0.10	0.07	0.10
C8-group	0.36	0.41	0.28	0.39	0.22	0.34
C9-group	0.67	0.53	0.59	0.97	0.57	0.71
C10-group	0.78	0.91	1.17	2.09	0.97	1.19
C11-group	1.24	1.35	1.60	2.04	2.02	2.62
C12-group	1.96	9.20	12.19	22.58	11.44	16.43
C13-group	2.55	2.03	2.47	4.28	2.85	4.01
C14-group	2.98	2.86	3.19	5.27	3.57	5.25
C15-group	3.12	3.76	4.16	6.20	3.37	4.84
C16-group	3.71	2.65	2.77	3.69	2.47	3.33
C17-group	4.11	3.65	3.65	4.38	3.08	3.74
C18-group	3.81	3.26	3.08	3.35	3.53	3.48
C19-group	2.89	2.87	3.09	3.14	2.49	2.92
C20+	71.50	66.22	61.65	41.52	63.33	51.03

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