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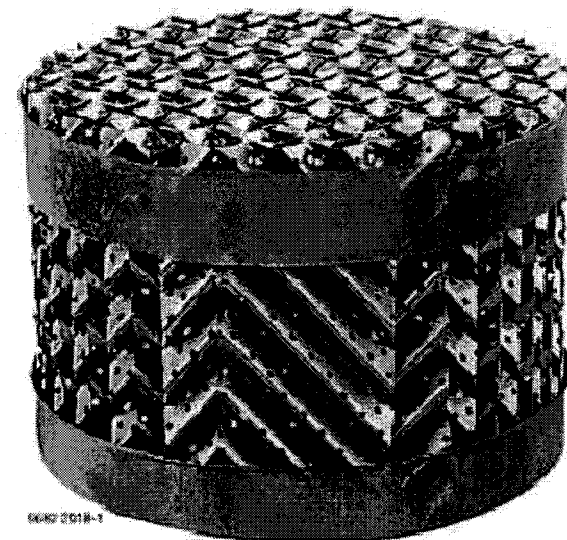
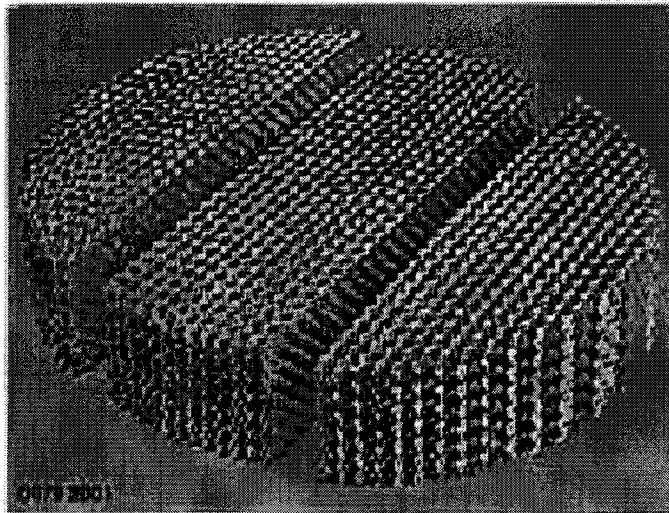
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**Fire Hazard Involving Structured Packing  
Past Knowledge of Sulzer Chemtech**

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# Fire Hazard Involving Structured Packing

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## Metal Gauze Structured Packing:

Several metal gauze fires were reported by customers after shutdown and opening of the columns in the 70s and early 80s.

- No revamps or hot work was involved in those incidents.
- All were attributed to spontaneous ignition of residual organic chemicals.
- Improved cleaning, shut down and cooling procedure of the columns prior to opening, effectively eliminated that risk.

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### Sheet Metal Structured Packing:

In connection with a test performed outside a column, Sulzer became aware of the potential of self sustaining combustion of sheet metal structured packing under certain extreme conditions.

- The test was performed in the late 80s on new stainless steel packing and involved cutting the packing with a torch.
- This experience led to procedures requiring protection of packing in vicinity of hot work.

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## Structured Packing in Air Separation:

The air separation community had concerns regarding the use of aluminum structured packing in oxygen rich sections of air separation columns.

- Extensive investigation showed that ignition of the packing would require a high energy ignition source.
- Reducing the ratio of heat capacity to surface area may reduce resistance to initial ignition.
- Residual lubricant on the packing in connection with oxygen was considered a potential fuel source.
- The use of structured packing became industry standard, however observing strict levels of degreasing.

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### General Observations:

- In spite of the high degree of attention such incidents gained lately, it is to be noted that they are extremely rare in view of the number of columns using structured packings and the frequency of column revamps involving structured packings.
- Self sustaining combustion of structured and random packing have been experienced.
- A separate high energy ignition source is required.
- A separate residual, combustible material is required.
- Most of the incidents were minor and resulted only in the destruction of some packing area without affecting the column and without bodily harm.

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## Observations Regarding Ignition:

Conditions conducive for spontaneous ignition are:

- Presence of organic or pyrophoric material on the packing.
- Temperature in the column.
- Exposure to atmospheric oxygen (or other oxidizing agent).
- Low heat capacity of the packing.

External heat sources:

Ignition can also be caused by external heat sources coming in contact with the residual combustible material (e.g. hot work).

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### Observations Regarding Fire Propagation:

Conditions conducive for fire propagation are:

- Vertical draft in the column from ventilation or convection.
- Continuous supply of oxygen from ventilation / convection.
- Presence of residual combustible material on the packing.
- High surface area of packing.
- Material of construction of packing.
- Low heat capacity of packing (material).
- Thin gauge packing material, however heavier gauge material will provide more heat of combustion once ignited.



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### Conclusions:

Attention needs to be paid to:

- Shut down, cleaning, cooling, and column opening procedures adapted to service and potential conditions of column – assume there is no such thing as “clean” packing!
- Monitor column conditions at all times during shut down.
- Be aware of ventilation in column, especially vertical draft.
- If hot work cannot be avoided, ensure adequate protection of the packing, implement safety procedures for work and prepare preventive measures. Continually monitor work and column conditions.
- Have contingency procedures and trigger points defined and ready for implementation.