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TEXAS AGRICULTURAL EXPERIMENT STATION

A. B. CONNER, DIRECTOR
COLLEGE STATION, BRAZOS COUNTY, TEXAS

BULLETIN NO. 449 APRIL, 1932

DIVISION OF CHEMISTRY

AVAILABILITY TO PLANTS OF POTASH IN POLYHALITE

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**In cooperation with U. S. Department of Agriculture.

Potash salts of commercial value are apparently contained in deposits which underlie a considerable area in western Texas and New Mexico, according to the investigations made by the U. S. Bureau of Mines, the U. S. Geological Survey, and the University of Texas. Although other minerals are present, polyhalite is the chief and most abundant mineral found in the Texas deposits. Polyhalite is a double sulphate of potassium and calcium and is not readily soluble in water, but 73.6 per cent of the total potash of polyhalite ground to pass a 20-mesh sieve, was found soluble in water by the A. O. A. C. method for potash in fertilizers. The availability of the potash in finely ground polyhalite, measured by eight pot experiments with corn, was 96 per cent of the potash in muriate or sulphate of potash. Only 38.6 per cent of the potash in polyhalite ground to pass a 10-mesh sieve, but not a 20-mesh sieve, was soluble in water. Polyhalite is suitable to use as a potash fertilizer when ground to pass a screen with 20 meshes to the inch.

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G. S. FRAPS

A salt deposit resulting from the evaporation of an ancient sea underlies approximately 40,000 square miles in western Texas and New Mexico, and apparently contains deposits of potash salts of commercial value (2,3). Evidence of the presence of deposits of potash in Texas was first announced by J. A. Udden of the University of Texas, in 1912, who found brines from a well drilled for oil in Dickens county to contain 5.4 per cent of potassium chloride. This lead to the examination for potash of cuttings from oil wells drilled in Texas and New Mexico by representatives of the U. S. Government and of the University of Texas. The strata are mixed or partly dissolved in the oil-well borings, so that the analysis indicates little more than the presence or absence of potash. For this reason, core wells which do not mix the strata, are necessary for satisfactory exploration. The first core drilling (6) which revealed potash beds of commercial value was finished in April, 1926, by the Texas Potash Corporation on a location made by Mr. Max Agress of Dallas. About 23 such wells have been drilled by the U. S. Bureau of Mines in cooperation with the U. S. Geological Survey, and cuttings from a large number of oil wells have also been examined. Potash salts have been found in wells drilled in Ector, Crane, Winkler, Reagan, Glasscock, Upton, and Crockett counties, Texas, and in Leo and Eddy counties, New Mexico (2). Some of the layers located are of sufficient size to be of commercial importance. Commercial shipments of potash salts containing about 27 per cent of potash were made in 1931 from a potash mine in Eddy county, New Mexico (5). Indications are that a large source of supply of potash salts may be developed (5), though the deposits are not well located with respect to transporation costs.

The chief potash salt found is polyhalite, though some sylvite (KCl) and other potash minerals have been found also.

POLYHALITE

Polyhalite is the chief potash mineral so far found at various points in western Texas and New Mexico, in wells drilled by the United States Bureau of Mines and by private operators. Large quantities are found in these deposits. It is also found in the European deposits of potash salts, but to a relatively small per cent. It is a dense, hard, relatively insoluble mineral, varying from pink to white in color and containing about 16% of potash when pure. Polythalite is a double sulphate of potash and calcium. All the potash is not soluble in water. The composition of pure polyhalite, according to the U. S. Bureau of Mines (1, 2), is $K_2SO_4.MgSO_4.2CaSO_4.2H_2O$. The fertilizer laws of most of the states allow credit only for water-soluble potash; thus that portion of the potash in polyhalite that is not soluble in water would not be included in the official analysis or the guarantee. The potash in polyhalite can be manufactured into sulphate of potash, which is a recognized source of potash of high quality. Studies of polyhalite and the possibility of manufacture of potash salts from it, are being made by the Bureau of Mines (1, 7, 8, 9, 10) and by Dr. E. P. Schoch of the University of Texas. Any process for the treatment of polyhalite would of course involve the expense of manufacture. If the crude salt could be used without treatment as a satisfactory source of potash in areas close to the supply of polyhalite, it could be supplied at a lower price than sulphate of potash manufactured from it.

It is, therefore, desirable to know if polyhalite can be used directly as a source of potash in agriculture, and to what extent the potash in it can be taken up by plants. This investigation to secure this information was suggested by the Bureau of Mines, and was conducted in informal cooperation between it and the Texas Agricultural Experiment Station. The polyhalite used was furnished by the Bureau of Mines. It was made up of fragments from various core sections from the borings in western Texas or New Mexico.

SOLUBILITY OF THE POTASH IN WATER

In case of a difficulty soluble mineral, both the solubility of the potash in water and the availability may depend upon the fineness of the sample. The sample was ground and sifted into two portions, one composed of particles passing through a sieve, 20 meshes to the inch, the other of particles which passed through a 10-mesh sieve and remained in the 20-mesh sieve.

The water-soluble potash was determined by the method of the Association of Official Agricultural Chemists, the use of which method is required by the fertilizer laws of the various states. A portion (2.425gm.) was treated with water as prescribed in the method for fertilizers and the analysis completed in the usual way. The results are given in Table 1.

Table 1—Solubility of potash in polyhalite

	31153, fine polyhalite, less than 20-mesh	31152, coarse polyhalite, 10- to 20-mesh
Water-soluble potash, per cent	9.70	4.86
Total potash, per cent	13.25	13.22
Percentage of total potash which is soluble in water	73.2	36.8

The analysis shows that 73.2 per cent of the potash was dissolved from the fine polyhalite, while 36.8 per cent was dissolved from coarse polyhalite. On the basis of this work, the fertilizer laws of most of the states would permit a guarantee of 73 per cent of the total potash in the finely ground polyhalite, and only 36 per cent of that in the coarsely ground polyhalite. The guarantee could be 9.5 per cent water-soluble potash in the finely ground polyhalite and 4.8 per cent in the coarsely ground material.

All the potash may be brought into solution (4) by boiling with water and allowing to stand over night (Steiger), or by heating with water and sodium carbonate in excess of that required to react with all the lime and magnesia present.

POT EXPERIMENTS WITH POLYHALITE

The availability of plant food to plants can be measured by comparing the quantity taken up by plants in pot experiments with the quantity taken up from a material containing the same plant food in a highly available form.

Pot experiments were conducted to test the availability of the potash of polyhalite to plants on sands and on several samples of soils. Galvanized iron pots containing 5,000 grams of soil were used. Each pot received 1.0

Figure 1. Comparative effect of potash in polyhalite, sulphate of potash, and greensand on the growth of corn in quartz sand No. 31116.

gram of dicalcium phosphate, and 1.25 to 2.0 gm. of ammonium nitrate. The quartz sand No. 3116 received in addition 2.0 gm. of calcium sulphate, 1.5 gm. of magnesium sulphate, and 0.13 gm. of ferric chloride. The potash materials added usually contained about 0.25 gm. potash, as shown in the tables. Water was added to one-half the saturation capacity of the soil.

Corn was planted as the first crop. The loss of water was replaced three times weekly. At the end of the period the crop was cut near the roots, dried, and analyzed for potash. In some cases the soil was dug up, and a second crop, sorghum, planted, which was handled in the same manner.

SOILS USED

31170 Tabor fine sandy loam, Brazos county, 0-7 inches.
31329 Potter clay loam, Potter county, 0-7 inches. Active potash 203 parts per million, basicity 6.3 per cent.
31330 Potter clay loam, Potter county, 7-19 inches. Active potash 35 parts per million, basicity 9.9 per cent.
31883 Frio clay, Frio county, 7-19 inches. Active potash 186 parts per million, basicity 10.0 per cent.
33130 Bowie fine sandy loam, Polk county, 3-7 inches. Active potash 58 parts per million, basicity 0.06 per cent.
33134 Susquehanna fine sandy loam, Polk county, 0-7 inches. Active potash 61 parts per million, basicity 0.4 per cent.
33136 Susquehanna fine sandy loam, Polk county, 18-24 inches. Active potash 96 parts per million, basicity 0.34 per cent.
32646 Lake Charles very fine sandy loam, Galveston county, 0-7 inches. Active potash 107 parts per million, basicity 0.9 per cent.
32648 Lake Charles very fine sandy loam, Galveston county, 13-32 inches. Active potash 81 parts per million, basicity 1.9 per cent.

DISCUSSION OF RESULTS

Details of the pot experiments are given in tables 2, 3, 4, and 5. The soil used for the work presented in Table 2 (31170) is the surface soil of Tabor fine sandy loam of Brazos county. The crops on the pots receiving a double amount of muriate of potash did not do well and are not included. The averages given are for three pots, and also for two pots in two of the groups with polyhalite; in one pot in each of these two groups the corn did not grow well. Quartz sand (No. 31116) was used in the experiments in Table 3. Very little potash was removed by the corn grown without additions of potash.

A summary of the pot experiments is given in Table 6. Figure 1 shows the growth on three of the pots. On one soil, the second crop removed appreciable amounts of potash, but the amounts removed by the second crop from the other two soils are very small or none at all. On one surface soil (No. 31329) the potash of the plyhalite was much more available than that of the sulphate of potash, while on the subsoil of this same soil (No. 31330) the reverse occurred. According to the average of all the experiments, the crop took up slightly more potash from finely ground polyhalite (less than 20-mesh) than from muriate or sulphate of potash. If the two experiments varying the most are not included, the crops removed on an average 64.1 per cent of the potash applied in finely ground polyhalite, compared with 66.8 per cent of the potash applied in muriate or sulphate of potash. The potash in finely ground polyhalite seems to be only about 4 per cent less available than that in muriate or sulphate of potash. The availability of the potash in finely ground polyhalite is therefore much higher than the solubility of its potash in water, which is 73.2 per cent (see Table 1).

In one of the pot experiments with the coarsely ground polyhalite (10 to 20-mesh), the availability of the potash was the same as that in the finely ground polyhalite or in the muriate of potash. In one of the other experiments, the availability was less than that of the finely ground polyhalite while in two others it was greater. On an average of the few tests made the availability of the potash in the coarse polyhalite was slightly greater than that in the fine. This result requires confirmation by additional work as it does not seem probable. The availability of the coarse polyhalite was nearly double its solubility in water (36.8% in Table 1).

ACKNOWLEDGMENT

The sample of polyhalite was furnished by the U. S. Bureau of Mines. Analytical and other work was done by Mr. E. C. Carlyle, S. E. Asbury, T. L. Ogier, Waldo Walker, and other members of the staff.

Table 2—Potash recovered by corn grown on soil No. 31170.

Pot numbers	Additions	Dried weight of corn, grams	Potash in corn, per cent	Grams potash	Potash recovered, gram	Per cent Potash recovered
19 DN	Blank	19.5	2.05	.3998	-------	-------
20 DN	Blank	12.6	2.51	.3163	-------	-------
21 DN	Blank	12.2	2.53	.3087	-------	-------
	Average	14.8	2.36	.3416	-------	-------
22 DNKa	Muriate of potash, .2545 gm. potash	16.9	3.17	.5357	-------	-------
23 DNKa	Muriate of potash, .2545 gm. potash	23.0	2.44	.5612	-------	-------
24 DNKa	Muriate of potash, .2545 gm. potash	21.4	2.51	.5371	-------	-------
	Average	20.4	2.71	.5447	.2031	79.8
31 DNH	Polyhalite, coarse, .2512 gm. potash	11.5	3.64	.4186	-------	-------
32 DNH	Polyhalite, coarse, .2512 gm. potash	19.4	2.59	.5025	-------	-------
33 DNH	Polyhalite, coarse, .2512 gm. potash	15.2	3.24	.4925	-------	-------
	Average	15.4	3.16	.4712	.1296	51.6
	Average except 31	-------	-------	.4975	.1559	62.1
34 DNHF	Polyhalite, fine, .2518 gm. potash	6.5	3.69	.2399	-------	-------
35 DNHF	Polyhalite, fine, .2518 gm. potash	14.5	3.46	.5017	-------	-------
36 DNHF	Polyhalite, fine, .2518 gm. potash	20.0	2.71	.5420	-------	-------
	Average	13.7	3.29	.4279	.0863	34.3
	Average of pots 34 and 35	-------	-------	.5218	.1802	71.6
37 DN2Ka	Muriate of potash, .5090 gm. potash	12.0	4.12	.4944	-------	-------
38 DN2Ka	Muriate of potash, .5090 gm. potash	2.5	4.17	.1043	-------	-------
39 DN2Ka	Muriate of potash, .5090 gm. potash	4.2	3.75	.1575	-------	-------
	Average	6.2	4.01	.2521	-------	-------

Table 3—Potash recovered by corn grown on quartz sand No. 31116.

Pot numbers	Additions	Dried weight of corn, grams	Potash in corn, per cent	Grams potash	Potash recovered, gram	Per cent Potash recovered
31 DNKa	Muriate of potash, .2545 gm. potash	10.0	2.02	.2020	......	......
32 DNKa	Muriate of potash, .2545 gm. potash	10.5	1.74	.1827	......	......
33 DNKa	Muriate of potash, .2545 gm. potash	10.5	1.85	.1943	......	......
	Average	10.3	1.87	.1930	.1924	75.7
34 DN2Ka	Muriate of potash, .5090 gm. potash	8.5	4.40	.3740	......	......
35 DN2Ka	Muriate of potash, .5090 gm. potash	12.0	2.84	.3408	......	......
36 DN2Ka	Muriate of potash, .5090 gm. potash	8.7	3.89	.3384	......	......
	Average	9.7	3.71	.3511	.3505	68.9
55 DNH	Polyhalite, coarse, .2512 gm. potash	11.6	1.74	.2018	......	......
56 DNH	Polyhalite, coarse, .2512 gm. potash	12.2	1.51	.1842	......	......
57 DNH	Polyhalite, coarse, .2512 gm. potash	10.1	1.95	.1970	......	......
	Average	11.3	1.40	.1943	.1937	77.1
58 DNHF	Polyhalite, fine, .2518 gm. potash	12.5	1.62	.2025	......	......
59 DNHF	Polyhalite, fine, .2518 gm. potash	12.0	1.63	.1956	......	......
60 DNHF	Polyhalite, fine, .2518 gm. potash	9.5	1.92	.1824	......	......
	Average	11.3	1.72	.1935	.1939	77.0
28 DN	Blank	0.1	0.56	.0006	......	......
29 DN	Blank	0.1	0.56	.0006	......	......
30 DN	Blank	0.1	0.56	.0006	......	......
	Average	......	......	.0006	......	......

Table 4—Potash recovered by crops, 1930.

Pot number	Soil and addition	Dried weight of crop, gm.	Potash in crop, per cent	Grams potash	Average grams potash	Potash recovered, grams	Per cent potash recovered
	31329—corn						
1 DN	Blank	23.0	5.10	1.1730	-------	-------	-------
2 DNKa	Sulphate of potash, .2412 gm. potash	31.5	3.98	1.2537	-------	.0807	33.5
3 DNH	Polyhalite, .2518 gm. potash	33.4	3.93	1.3126	-------	.1396	55.4
	31329—kafir (second crop)						
DN	Blank	42.2	1.80	.7596	-------	-------	-------
DNKa	Sulphate of potash, .2412 gm. potash	42.0	1.94	.8148	-------	.0552	22.8
DNH	Polyhalite, .2518 gm. potash	42.9	1.99	.8537	-------	.0941	37.4
	31330—corn						
1 DN	Blank	12.5	3.17	.3963	.3370	-------	-------
2 DN	Blank	6.5	4.27	.2776	-------	-------	-------
3 DNKa	Sulphate of potash, .2412 gm. potash	14.0	3.09	.4326	-------	-------	-------
4 DNKa	Sulphate of potash, .2412 gm. potash	21.9	3.39	.7424	.5870	.1500	62.2
5 DNH	Polyhalite, .2518 gm. potash	9.5	4.59	.4361	-------	-------	-------
6 DNH	Polyhalite, .2518 gm. potash	13.0	3.74	.4862	.4612	.1242	49.3
	31330—kafir						
1 DN	Blank	36.9	1.34	.4945	-------	-------	-------
2 DN	Blank	38.7	1.37	.5302	.5124	-------	-------
3 DNKa	Sulphate of potash, .2412 gm. potash	31.0	1.62	.5022	-------	-------	-------
4 DNKa	Sulphate of potash, .2412 gm. potash	34.5	1.46	.5037	.5030	0	-------
5 DNH	Polyhalite, .2518 gm. potash	36.5	1.67	.6096	-------	-------	-------
6 DNH	Polyhalite, .2518 gm. potash	32.0	1.55	.4960	.5028	0	-------

Table 4—Potash recovered by crops, 1930 (continued).

Pot number	Soil and addition	Dried weight of crop, gm.	Potash in crop, per cent	Grams potash	Average grams potash	Potash recovered, grams	Per cent potash recovered
	31883—corn						
1 DN	Blank	22.7	4.62	1.0487	....	....	....
2 DN	Blank	25.2	4.37	1.1012	....	....	....
3 DN	Blank	20.5	4.19	.8570	1.0030	....	....
4 DNKa	Sulphate of potash, .2412 gm. potash	27.0	4.86	1.3122	....	....	....
5 DNKa	Sulphate of potash, .2412 gm. potash	27.5	4.13	1.1358	....	....	....
6 DNKa	Sulphate of potash, .2412 gm. potash	19.2	4.70	.9024	1.1168	.1138	47.2
7 DNH	Polyhalite, .2518 gm. potash	26.7	4.45	1.1882	....	....	....
8 DNH	Polyhalite, .2518 gm. potash	22.4	4.48	1.0035	....	....	....
9 DNH	Polyhalite, .2518 gm. potash	20.0	5.61	1.1220	1.1046	.1016	40.4
	31883—kafir (second crop)						
1 DN	Blank	33.5	1.89	.6332	....	....	....
2 DN	Blank	33.9	1.92	.6509	....	....	....
3 DN	Blank	36.7	1.92	.7046	.6629	....	....
4 DNKa	Sulphate of potash, .2412 gm. potash	38.4	1.96	.7526	....	....	....
5 DNKa	Sulphate of potash, .2412 gm. potash	33.0	1.93	.6369	....	....	....
6 DNKa	Sulphate of potash, .2412 gm. potash	29.9	2.11	.6309	.6668	.0039	1.6
7 DNH	Polyhalite, .2518 gm. potash	36.0	1.81	.6516	....	....	....
8 DNH	Polyhalite, .2518 gm. potash	35.5	2.04	.7242	....	....	....
9 DNH	Polyhalite, .2518 gm. potash	33.5	1.95	.6533	.6697	.0068	2.7
10 NK		26.0	....	....	....	....	....

Table 5. Potash recovered by corn, 1931.

Pot number	Soil and addition	Wt. of crop grams	Analysis potash per cent	Grams potash in crop	Average grams potash	Gain potash over ND	Per cent potash recovered
	Soil 33134						
1 ND	Blank	31.0	.68	.2108	......	......	......
2 ND	Blank	33.0	.72	.2376	......	......	......
3 ND	Blank	28.4	.77	.2187	.2224	......	......
4 NDKa	Sulphate of potash, 0.25 gm. potash	33.0	1.23	.4059	......	......	......
5 NDKa	Sulphate of potash, 0.25 gm. potash	34.7	1.20	.4164	.4112	.1888	75.5
6 NDY	Polyhalite, fine, 0.25 gm. potash	24.0	1.65	.3960	......	......	......
7 NDY	Polyhalite, fine, 0.25 gm. potash	37.2	1.11	.4129	......	......	......
8 NDY	Polyhalite, fine, 0.25 gm. potash	31.1	1.23	.3825	.3971	.1747	69.9
	Soil 32646						
1 ND	Blank	39.2	.94	.3685	......	......	......
2 ND	Blank	44.7	.80	.3576	......	......	......
3 ND	Blank	43.5	.83	.3611	.3624	......	......
4 NDKa	Sulphate of potash	44.5	1.31	.5830	......	......	......
5 NDKa	Sulphate of potash	39.5	1.33	.5254	......	......	......
6 NDKa	Sulphate of potash	43.5	1.16	.5046	.5377	.1753	70.1
7 NDY	Polyhalite, fine	43.2	1.23	.5314	......	......	......
8 NDY	Polyhalite, fine	39.2	1.30	.5096	......	......	......
9 NDY	Polyhalite, fine	43.5	1.19	.5177	.5196	.1572	62.9
10 NDM	Polyhalite, coarse	43.7	1.23	.5375	.5375	.1751	70.0
	Soil 33136						
1 ND	Blank	6.2	3.73	.2313	......	......	......
2 ND	Blank	7.4	2.96	.2190	.2252	......	......
3 NDKa	Sulphate of potash	8.4	4.27	.3587	......	......	......

Table 5. Potash recovered by corn, 1931 (continued).

Pot number	Soil and addition	Wt. of crop grams	Analysis potash per cent	Grams potash in crop	Average grams potash	Gain potash over ND	Per cent potash recovered
4 NDKa	Sulphate of potash	8.5	4.07	.3460	.3524	.1272	50.9
5 NDY	Polyhalite, fine	9.7	3.74	.3628	-------	-------	-------
6 NDY	Polyhalite, fine	8.0	4.31	.3448	.3538	.1286	51.4
7 NDM	Polyhalite, coarse	9.2	4.57	.4204	.4204	.1952	78.1
	Soil 33130						
1 ND	Blank	26.2	1.03	.2699	-------	-------	-------
2 ND	Blank	28.0	.90	.2520	-------	-------	-------
3 ND	Blank	27.0	.95	.2565	.2595	-------	-------
4 NDKa	Sulphate of potash	31.2	1.49	.4649	-------	-------	-------
5 NDKa	Sulphate of potash	30.4	1.53	.4651	-------	-------	-------
6 NDKa	Sulphate of potash	29.9	1.49	.4455	.4585	.1990	79.6
7 NDY	Polyhalite, fine	28.2	1.62	.4568	-------	-------	-------
8 NDY	Polyhalite, fine	30.3	1.52	.4606	-------	-------	-------
9 NDY	Polyhalite, fine	21.5	2.05	.4408	.4527	.1932	77.3
	Soil 32648						
1 ND	Blank	23.7	1.48	.3508	-------	-------	-------
2 ND	Blank	27.7	1.35	.3740	-------	-------	-------
3 ND	Blank	23.7	1.36	.3223	.3490	-------	-------
4 NDKa	Sulphate of potash	28.0	1.74	.4872	-------	-------	-------
5 NDKa	Sulphate of potash	24.8	2.00	.4960	-------	-------	-------
6 NDKa	Sulphate of potash	25.7	1.83	.4703	.4845	.1355	54.2
7 NDY	Polyhalite, fine	25.2	2.01	.5065	-------	-------	-------
8 NDY	Polyhalite, fine	24.5	1.96	.4802	-------	-------	-------
9 NDY	Polyhalite, fine	27.2	1.87	.5086	.4984	.1494	59.8

Table 6. Percentage of potash recovered from polyhalite and from sulphate of potash.

Soil Number	Crop	Coarse polyhalite	Fine polyhalite	Muriate or sulphate of potash
31170	Corn	62.1	71.6	79.8
31116	Corn	77.1	77.0	75.7
31329	Corn, first crop	.....	55.4	33.5
	Kafir, second crop	.....	37.4	22.8
	Total, 2 crops, corn and kafir	.....	92.8	56.3
31330	Corn, first crop	.....	49.3	62.2
	Kafir, second crop		0	0
31883	Corn, first crop	.....	40.4	47.2
	Kafir, second crop		2.7	1.6
	Total, 2 crops, corn and kafir	.....	43.1	48.8
33134	Corn	.....	69.9	75.5
32646	Corn	70.0	62.9	70.1
33136	Corn	78.1	51.4	50.9
33130	Corn	.....	77.3	79.6
32648	Corn	.....	59.8	54.2
	Average of all (10)	.....	65.5	65.3
	Average, omitting 31329 and 31330 (8)	.....	64.1	66.8
	Average where coarse polyhalite used (4)	71.8	65.7	69.1
	Average availability, omitting 3 and 4 (8)	.....	96	100

SUMMARY

Potash salts of commercial value are apparently contained in deposits which underlie a large area in western Texas and New Mexico, according to investigations by the U. S. Bureau of Mines, the U. S. Geological Survey, and the University of Texas. Although other potash minerals are present, polyhalite is the chief and most abundant potash mineral present in the potash minerals found in deep wells in western Texas and in New Mexico. Polyhalite is a double sulphate of potash and lime. It contains about 12 per cent of total potash. The potash of polyhalite is not completely soluble in water, but 73.2 per cent of the total potash in polyhalite ground to pass a 20-mesh sieve was found to be soluble in water by the A. O. A. C. method for potash in fertilizers. The availability of the potash in finely ground polyhalite, as found on the average of eight pot experiments, was 96 per cent of that of sulphate or muriate of potash. The potash in polyhalite which passed a 10-mesh sieve but did not pass a 20-mesh sieve, was 36.8 per cent soluble in water. The availability of the potash in four pot experiments was equal to that of muriate of potash. Polyhalite is suitable for use as a potash fertilizer when ground to pass a 20-mesh sieve.

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