ISSN: 2776-0960 Volume 2, Issue 5 May, 2021

GALLURGIC CONCENTRATION OF TUPAKATON SYLVINITE ORE WITH AMMONIA

Z. T. Ruzieva,
Associate Professor,
Karshi Engineering-Economics Institute;

M. Murodullaeva,
Master's Student,
Karshi Engineering-Economics Institute

Abstract

The article outlines the use of potash fertilizer. Enrichments of sylvinite. Methods of enrichment. Complex cheese is used to enrich sylvinite. The solubility of 20-40^{o}C of the three-component system KCl-NaCl-H_2O has been studied.

Keywords: hallurgy, crystallization, sludge, suspension, repulpator, centrifuge, neutralization

In recent years, the demand for potassium fertilizers in Uzbekistan, based only on the demand of cotton growers, is 722,000 tons. According to many years of experience, the application of potassium fertilizers to the soil significantly increases the yield not only for cotton, but also for other agricultural crops of the Republic (grain, melons and fodder).

The purpose of the work is to develop continuous and waste-free technologies for processing potassium ores in Uzbekistan.

When the gallurgical method is used, pure sodium chloride is formed and can be used in the example of food salt or in the production of inorganic sodium.

Consequently, the problem of water scarcity and the formation of a solution heated to 100^{o}C and the crystallization of potassium chloride from a saturated solution require a large amount of energy to crystallize potassium chloride.

Therefore, the main task in the enrichment of sylvinite by the gallurgical method is to perform at low temperatures and with a small amount of water.

For this purpose, we studied the isothermal method in multi-component systems, containing sodium chloride, potassium in aqueous medium in the presence of ammonia in a wide temperature and concentration range [1, 2].

Sodium chloride and potassium brand "XCh" and 25% ammonia water were used for the experiment.

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

Solubility in a thermostat filled with water at +20°C and +40°C was studied. The temperature in the thermostat varies from ±0.1°C to 0°C due to water and crushed ice. To maintain the temperature, -10°C crushed ice and technical salt are mixed in a tank. In this case, to maintain the temperature, the container is filled with a measured amount of salt, water and 25-28% ammonia at ± 0.2°C (30-50 ml). The cabinet is quickly and tightly sealed with a rubber stopper, the thermostat shaft is twisted and fastened with a clamp.

For analysis, the liquid phase is taken with a digital pipette, measured in a volumetric pipette, and the density of the solution is determined. The filtering function is performed by placing a cotton swab on the bottom of the pipette. To prevent free ammonia from being wasted, pipette into a volumetric flask and quickly add water, mixing the solution with water.

At a temperature of -10 degrees and containing 40g of ammonia and 100g of aqueous pipette, the pipette is placed in a pre-weighed aqueous measuring tube as the solution cannot be weighed. Saturated solution and solid phase occur in all systems.

The literature provides information on the methods of obtaining sylvinite by processing ores. Various organic flotation reagents are used in flotation recycling. Flotoreagents are not produced in our republic. However, 500,000 tons of sodium chloride released are contaminated with various organic substances.

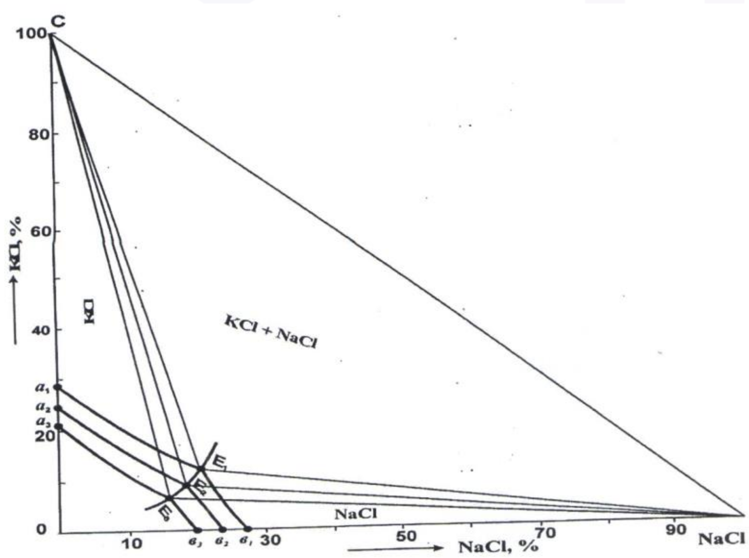

Figure 1. Sobility of the system $KCI–NaCI-NH_3–H_2O$ at a temperature of 20°C. The mass content of ammonia in an aqueous solution is equal to 1-0; 2-3; 3-7,5; 4-15%.

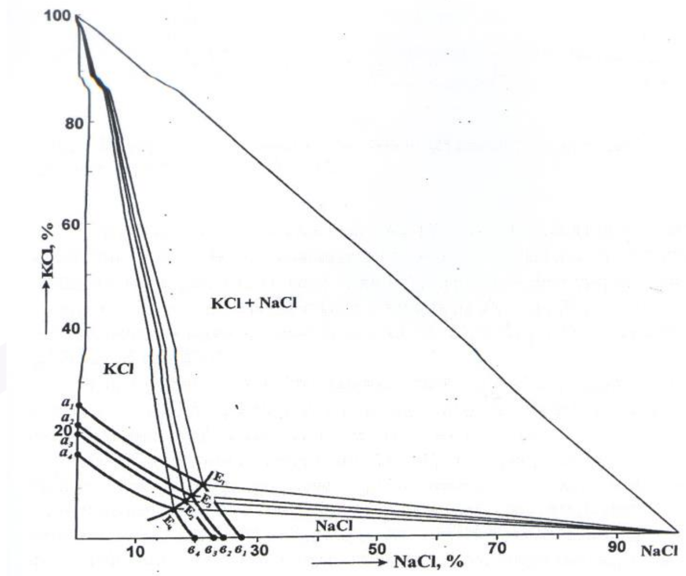

Figure 2. Sobility of the system KCI–NaCI-NH_3–H_2O at a temperature of 40°C.

When silvinite is processed with this solution, basically only the KCI dissolves. After the NaCI solid residue is separated, another E60 euthalene residue is obtained, and when cooled, the N-containing residue is separated. In this process, pure NaCI is obtained in silvin enrichment with 85-90% KCI.

The analysis diagrams show that the KCI in the sylvinite is such that in order to completely separate the KCI in the sylvinite, their quantity must correspond to the amount of moving silk.

If the sylvinite contains 33% KCI and 67% KCI (point S), the point S located between the lines $E^{11}{}_{20}$ and $E^{11}{}_{20}$ in the motochny solution.

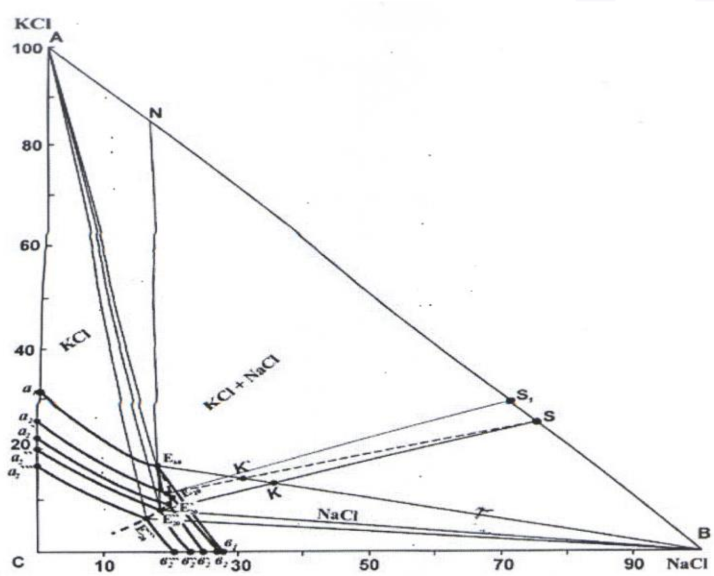

Figure 3. KCI–NaCI-NH_3–H_2O

The solubility diagram at a temperature of 40°C corresponds to the composition of a K-containing mixture. In the processing of sylvinite to completely dissolve KCI, and at the same time to obtain an eutonic solution E60, the uterine solution E^{11}_{20} k/kS is 37/82=0.451, so that the system is full of new compounds KCI-NaCI-NH_3–H_2O at a temperature of 40 degrees. In order to obtain 1 t KCI in the presence of ammonia, new compounds are formed at a temperature of 20-40°C in water.
In order to obtain 1t KCI in the presence of ammonia, the water sorbent should be in small quantities at a temperature of 20-40°C. Than in the case without ammonia.

Table 1. Secondary and tertiary point of the system KCI–NaCI-NH_3–H_2O at a temperature of 40^0C.

Liquid phase composition, %				Temperature, °C	Solid phase	Density liquid phase г/см³
KCI	NaCI	NH_3	H_2O			
25,72	0,00	-	74,28	20	KCI	1,176
10,55	20,71	-	68,74	20	KCI +NaCI	1,240
0,00	26,61	-	73,4	20	NaCI	1,193
22,16	0,00	2,72	75,12	20	NaCI	1,078
19,54	8,34	2,52	77,94	20	KCI +NaCI	1,171
0,00	24,56	2,64	72,80	20	NaCI	1,081
20,82	0,00	5,94	73,24	20	KCI	1,098
7,30	18,03	5,60	69,07	20	KCI +NaCI	1,185
09,00	22,50	6,01	74,18	20	NaCI	1,069
16,50	0,00	12,53	70,97	20	KCI	1,133
17,02	5,91	11,56	65,51	20	KCI +NaCI	1,196
0,00	19,91	12,01	68,08	20	NaCI	1,119
28,87	0,00	-	71,13	40	KCI	1,194
12,57	20,34	-	87,43	40	KCI +NaCI	1,242
0,00	26,76	-	73,24	40	NaCI	1,97
24,84	0,00	5,64	69,52	40	KCI	1,045
9,3	18,34	5,43	66,96	40	KCI +NaCI	1,089
0,00	23,5	5,74	70,76	40	NaCI	1,027
21,33	0,00	11,8	66,87	40	KCI	1,048
6,51	16,28	11,58	65,63	40	KCI +NaCI	1,093
0,00	20,81	11,88	97,31	40	NaCI	1,036

Once the isothermal data have been cast, the size of the potassium chloride and sodium chloride fields expands insignificantly as the temperature rises to 20-40°C.
The technology for obtaining potassium chloride from silvinite was developed on the basis of laboratory data. The feasibility study shows that the proposed method characterizes the profitability. Potassium chloride solubility and efficiency of the crystallization process are also achieved by reducing the overall technological scheme.

The system KCI - NH3 – H_2O

Data on the solubility of KCI in water were obtained from reference books [3-4]. The solubility magnitude is given for the cryohydrate point at a temperature of +50 degrees. There are only two different phases: KCI and ice.

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

The solubility of KCI at temperatures from -15°C to +32°C in concentrated water in ammonia solution (150-300g of NH_3 100_2 H_2O) was studied by E. Schmid at 15.5 degrees, by G. Stam and J. Lausanne [5-6].
The solubility of KCI decreases with increasing concentration of NH_3 and with decreasing temperature.
Only the isotherm of 10g of NH_3 is not extronomerized in the low temperature region, but at such a temperature a solution saturated with calcium chloride and ice is formed simultaneously in this isotherm. It can be proved that the solution is at a temperature of 20 degrees and 16.95g of NH_3, 100g of H_2O is only KCI saturated, the concentration of the solution is 16.95 g, at which time NH_3-H_2O is also an ice-saturated solution system.

Table 2. Solubility of the system KCl-NH_3-H_2O.
In solid phase - KCl

Density	100г H_2O in G		Density	100г H_2O in G	
	NH_3	KCl		NH_3	KCl
	Isotherm -10⁰C			Isotherm - +20⁰C	
1,059		18,3	1,094		26,6
0,987	10,0	12,5	1,013	10,0	19,9
0,942	25,0	9,7	0,955	24,8	16,3
	39,8			40,0	
1,073	Isotherm -10⁰C	21,1	1,100	Isotherm - +40⁰C	32,0
0,995		15,0	1,010		24,4
0,950	10,0	11,7		10,0	21,2
	25,0			24,3	21,1
	39,7			34,8	
				36,2	

In the KCI-NH_3 – H_2O system, no ice menia, especially Ogr NH_3, were shown in the isotherm where no cryohydrate points were detected. The expressed isotherm is represented by parallel bent menisci.
Isotherms -10.0 +20 and +40 The isotherms found in the study were found to be +10 and - + - 30 interpolation isotherms with -20 and +50 extrapolation. The previously given isotherms are broken down at a temperature of -20 degrees NH_3=16.95 g/l.

Given the density of KCI water-ammonia solution (in Table 3), the NH_3 concentration decreases with increasing.

Table 3. Solubility of the system KCl-NH_3-H_2O.

In solid phase - KCl

NH_3 to 100g H_2O	KCl, to 100g H2O							
	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
0	-	25,0	28,5	31,5	34,5	37,3	40,1	42,9
10	-	18,3	22,1	23,8	26,6	29,3	32,0	34,8
20	11,5	14,0	16,5	19,0	21,4	23,8	26,32	28,8
25	10,2	12,5	15,0	17,3	19,7	22,0	24,2	26,7
30	9,1	11,3	13,7	15,9	18,1	20,3	22,5	24,8
40	7,4	9,7	11,7	13,9	16,2	18,2	20,4	22,8

Extropolar data are given in Table 3 for the general use of the results of the solubility of KCI in aqueous solution of ammonia.

References

1. Pechkovsky V.V. Technology of potash fertilizers. Minsk. "High school". 1978. p.3
2. Polov V.S. New data on the industrial potassium content of the Upper Jurassic halogen formation in Central Asia. - DAN 1975.
3. Golubeva M.M. Bergman A.G. Adiagolic reciprocal system of the type of sulfates and chlorides of potassium and cobalt. DAN, 1988.
4. P.V. Dybina, A.S. Solovyova, Y.I. Vishnyakh, Inorganic Substance Technology Calculations. 1967.
5. Kashkarov O.D. Sokolov I.D. Potash fertilizer technology. L., "Chemistry". 1978.
6. M.N. Nabiev Ochiskina R.G. Potassium salts of Tyubegatan. Tashkent. Ed. "The science". 1994.