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Research and Production of Magnesium Chlorite Based on Talc Stone Zipelbulak Deposit

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ABSTRACT: For successful and high-quality harvesting of raw cotton in a short time, such an event as defoliation is carried out. One of the high-quality defoliants among defoliants in Uzbekistan is magnesium chlorate. The industrial method for producing magnesium chlorate is based on the interaction of sodium chlorate with six aqueous magnesium chloride. In Uzbekistan, bischofite, supplied from Turkmenistan, is used as a raw material for the production of magnesium chlorate. In Uzbekistan, one of the raw materials for the production of magnesium compounds or magnesium chloride can be the talc stone of the Zipelbulak deposit, located in the Republic of Karakalpakstan in the Sultanuvayse region, it is considered the only talc stone deposit in Central Asia, whose reserves, according to geologists, are about 200 million tons.

KEYWORDS:defoliant, defiling activity, bischofite, hydrochloric acid decomposition.

I. INTRODUCTION

Cotton growing is one of the important sectors of the national economy of many countries of the world, including the Republic of Uzbekistan [1-3]. The main factor in growing a high and high-quality crop from agricultural crops is the use of chemicals: mineral fertilizers, stimulants, pesticides, as well as defoliants and desiccants [4]. For a successful and high-quality harvest of raw cotton in a short time, an event such as defoliation is carried out. In turn, this is due to the effectiveness of the defoliants used to shed cotton leaves [5]. The main conditions for the effective use of defoliants are: high defiling activity, which ensures that leaves fall up to 80-90%, no negative impact on the raw cotton crop, on the quality of fiber and cotton seeds: environmental safety, from the point of view of environmental protection; low cost [6].

It should be noted that today the range of used defoliants has significantly expanded. For example, chlorates of alkali and alkaline earth metals, organic phosphorus, etc., which are widely used both in our country and abroad for a number of years [7]. Magnesium chlorate is one of the quality defoliants among defoliants in Uzbekistan. The industrial method for obtaining magnesium chlorate is based on the interaction of sodium chlorate with six aqueous magnesium chloride [8]. In Uzbekistan, bischofite supplied from Turkmenistan is used as a raw material for the production of magnesium chlorate.

Actually. The cost of the defoliant produced in Uzbekistan is also high due to the fact that six molecules of hydrous magnesium chloride are imported [9] The production of magnesium chlorate defoliant based on local raw materials leads to a significant cost reduction and the rational use of local raw materials in our work we used Zipelbulak talc - local raw materials [10].

Talc is easily recognized by its low hardness, light color, perfect cleavage, greasy feeling in the hands. It is similar to pyrophyllite, which differs only in chemical reactions. As far as we know, mineral talc mainly contains a complex corresponding to the formula Mg3 [Si4O10] (OH) 2. According to this, talc contains 31.7% MgO, SiO2-63.5%, H2O-4.8% and no more [11]. Depending on education and conditions, there may be some deviations from the basic formula. The crystal structure of talc is close to the crystal structure of mica. They are called wen, steatite, soap or pot stones. The color is light green, greenish white, greenish gray, yellowish gray, yellowish white. Glass luster with a mother-of-pearl sheen.Hardness 1 kg/mm2.Fat to the touch. Cleavage is very perfect. Density 2.7-2.8 kg / dm3. After strong annealing, talc acquires a hardness of 6 kg/mm2 [11]. Talc is used as a refractory and acid-resistant material. Finely ground talc is widely used in agricultural paper, rubber, textile, cosmetic, paint and varnish, food industry, in

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medicine, in electronic technology [12]. The talc stone containing impurities is used in the form of refractory bricks and slabs. The Ural deposits (Shabrovskoe, Medvedevskoe) are world famous. There is talc in the Kemerovo region (Alguyskoe), in Karelia, Kazakhstan (Almalyk). Associated with carbonate rocks, large deposits are located in Canada [13]. At the same time, talc was found at the Zipelbulak deposit of the Republic of Karakalpakstan, located on the territory of Uzbekistan. The composition and properties of the mineral talc have been studied with the aim of meeting the demand for magnesium-containing compounds used in the country, with the judicious use of the mineral.

II. SIGNIFICANCE OF THE SYSTEM

For successful and high-quality harvesting of raw cotton in a short time, such an event as defoliation is carried out. The study of literature survey is presented in section III, methodology is explained in section IV, section V covers the experimental results of the study, and section VI discusses the future study and conclusion.

III. METHODOLOGY

In Uzbekistan, one of the raw materials for obtaining magnesium compounds or magnesium chloride can be the talc stone of the Zipelbulak deposit, located in the Republic of Karakalpakstan in the Sultanuweise region, it is considered the only talc stone deposit in Central Asia, the reserves of which, according to geologists, are about 200 million tons. [fourteen]. Therefore, the interest in studying this mineral and obtaining magnesium chloride is very important.

When carrying out research to determine the mineralogical composition of the mineral, the following methods of physical and chemical research were used:

X-ray structural analysis is a method for studying the structure of a substance by distribution in space and the intensity of X-ray radiation scattered on the analyzed object. X-ray structural analysis - carried out on a powder X-ray diffractometer "Shimadzu XRD-6100". The sample powders were mixed thoroughly to obtain a medium sample. Semi-quantitative X-ray phase analysis by the Rietveld method was carried out using the software “Profex - Opensource XRD and Reitveld Refinement”.

Spectral analysis is a set of methods for the qualitative and quantitative determination of the composition of an object, based on the study of the spectra of the interaction of matter with radiation, including the spectra of electromagnetic radiation, acoustic waves, mass and energy distribution of elementary particles, etc. and S-115 established the qualitative and quantitative characteristics of ions in solutions

IV. EXPERIMENTAL RESULTS

The talc stone of the Zipelbulak deposit has been studied by rengenographic analysis, mass spectroscopic methods of chemical and physicochemical analysis.

The experiments were carried out as follows. First, a certain amount of talcum stone was thoroughly mixed in a laboratory mechanical mortar RM200 and a vibrating sieving machine AC-200 BASIC on sieves No. 0.05; 0.4; 0.8; 3.0 mm.

Chemical analysis of the samples was carried out on spectrometers SRM 20 and P-115. The chemical composition of the mineral is given in table. 1.

Table 1
Chemical composition of talc stone from the Zipelbulak deposit

Raw materials	Content of components, weight.%											
	SiO_2	CaO	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	K_2O	Na_2O	H_2O	SO_3	ppp
Talc	38,3	1,0	1,58	6,43	0,45	0,17	31,83	0,15	0,12	2,45	0,14	17,48

Table 2 shows the results of mass spectrometric (ICP - MS) analysis of talcum stone. From the table it follows that talcum stone contains in its composition a number of elements necessary in various sectors of the national economy.

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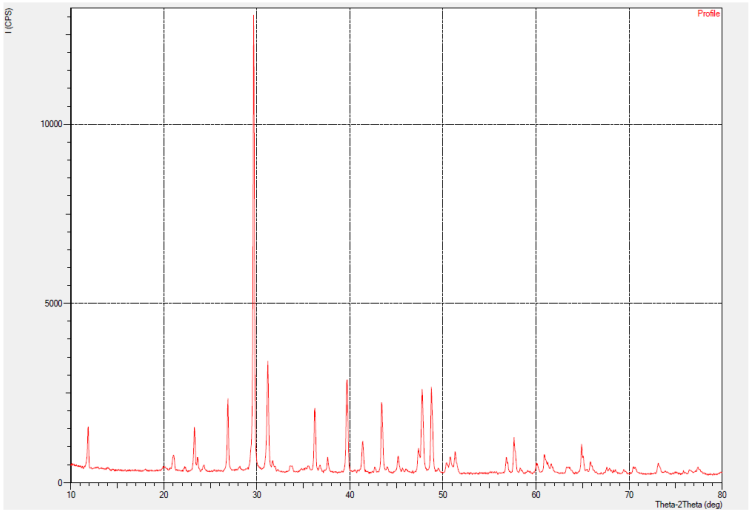
Table 2
Results of mass spectrometric analysis of talc stone from the Zipelbulak deposit

name and content of elements, in y/t									
Li	Be	B	Na	Mg	Al	P	K	Ca	Cr
43,0	0,76	18,0	6200	35000	55000	2100	4400	62000	25,0
Mn	W	Co	Ni	Cu	Zn	Mo	Ag	Ba	U
2100	1,41	37,0	10,0	55,0	250	1,70	0,210	21,0	0,370

Based on the X-ray phase analyzes of rock-forming minerals in talc, it was found that the main minerals are: talc (3MgO · 4SiO2 · H2O or Mg3Si4O16 (OH) 2); serpentine (Mg6 [Si4O5] (OH) 8; ecstatite (Mg2 (Si2O6); quartz (SiO2); hematite (Fe2O3) and magnetite (Fe3O4) (Fig. 1).

Table 3 shows the composition of the dried sediments and filtrate obtained by the decomposition of the original talc stone with hydrochloric acid. The table shows that as the rate of hydrochloric acid in the first sediment increases, the SiO2 content increases from 80.71% (at a rate of 90%) to 83.97% (at a rate of 120%), and the content of Al2O3, Fe2O3, CaO, etc. decreases from 1.61 to 1.31; 2.19 to 1.95; 1.91 to 0.63; from 2.19 to 1.09%, respectively.



Rice. 1. X-ray diffraction pattern of talc stone from the Zipelbulak deposit

From these data it can be seen that the first precipitate is mainly composed of silicon dioxide. In the second draft, i.e. obtained after neutralizing the filtrate to a pH of 8.5 with an increase in the norm of hydrochloric acid, the content of SiO2 decreases from 9.81% to 9.65%, the content of Al2O3, Fe2O3, CaO and MgO increases from 10.71 to 11.23; from 39.32 to 43.11, and the content of CaO and MgO decreases from 4.66 to 4.19; from 1.77 to 1.29%, respectively. The third filtrate consists mainly of magnesium chloride, its concentration is 32.71% in terms of dry matter under optimal conditions is 92.89% (norm 105 table. 4.).

Table 3
Composition of sediments obtained from dislocated
Talcum stone with hydrochloric acid at different rates

Sulfuric acid rate, %	Content of components per dry mass of the first sludge, weight. %					
	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	p.p.p.
90	80,71	1,61	2,19	1,91	2,21	11,37
95	81,09	1,31	1,89	1,81	2,07	11,83
100	81,68	1,09	1,71	1,62	1,92	11,98
105	82,35	1,78	1,62	1,39	1,70	11,16
110	82,87	1,60	1,25	1,10	1,52	11,66
115	83,38	1,48	1,11	0,81	1,32	11,90
120	83,97	1,31	1,95	0,63	1,09	11,05
Content of components per dry mass of the second sludge, weight. %						

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90	9,81	10,71	39,32	4,66	1,77	33,73
95	9,64	11,06	39,17	4,79	1,98	33,36
100	9,48	11,14	40,23	4,41	1,09	33,65
105	9,25	11,53	40,29	4,36	1,17	33,40
110	9,04	11,84	40,71	4,82	1,26	32,33
115	9,86	11,07	42,22	4,79	1,31	30,75
120	9,65	11,23	43,11	4,19	1,29	30,53

Table 4
The composition of the filtrate obtained from the disintegrated Talcum stone with hydrochloric acid at different rates

Hydrochloric acid rate, %	Content of components per dry weight of sediment, wt.%					
	SiO_2	$AlCl_3$	$FeCl_3$	$CaCl_2$	$MgCl_2$	p.p.p.
90	-	0,06	0,51	0,12	92,71	6,60
95	-	0,07	0,55	0,14	92,96	6,28
100	-	0,09	0,63	0,15	93,01	6,12
105	-	0,12	0,71	0,18	93,20	5,79
110	-	0,14	0,85	0,20	93,27	5,54
115	-	0,15	0,85	0,20	93,47	5,33
120	-	0,15	0,91	0,21	92,89	5,84

V. CONCLUSION AND FUTURE WORK

Thus, preliminary studies of talc stone from the Zinelbulak deposit by X-ray diffraction analysis, IR spectroscopic, mass spectroscopic methods of chemical and physicochemical analyzes, as well as products obtained by hydrochloric acid decomposition, indicate the possibility of its use not only for obtaining heat-resistant ceramics, heat-insulating construction materials in their original form, but also for the production of magnesium chloride. High quality magnesium chlorate defoliant can be obtained from the obtained magnesium chloride.

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