

**RESEARCH METHODS FOR OBTAINING MAGNESIUM SALTS BY ACIDIC  
DISSECTION OF SERPENTINITE ROCK**

**Bekchanov Bekzod Bakhtiyarovich**

Uzbekistan Republic of Uzbekistan , Tashkent city

Tashkent chemical technology institute ,

« Inorganic substances chemical Technology » Department support doctoral student

**Juginisov Berdakh Bayrambay old man**

Karakalpakstan state university

Chemical engineering department support doctoral student

**Djandullaeva Munavvar Saparbayevna**

Uzbekistan Republic of Uzbekistan , Tashkent city

Tashkent chemical technology institute ,

« Inorganic substances chemical Technology » Department associate professor

**Erkayev Aktam Ulashevich**

Uzbekistan Republic of Uzbekistan , Tashkent city

Tashkent chemical technology institute ,

« Inorganic substances chemical Technology » Department head , professor

[bekzodbekchanov855@gmail.com](mailto:bekzodbekchanov855@gmail.com) phone:914341559

**Abstract**

In the world today's on the day magnesium salts to take main raw material serpentinite , dolomite , magnesite , talc, spring in the waters magnesium compounds and sea waters is . Serpentinite magnesium oxide and magnesium salts to take for the most cheap raw material is considered . But this raw the things again work technologies raw material resources excess waste energy demand high , again at work to nature damage technology that delivers in management complexity giving birth financial to trouble take arrival possible . Therefore in our republic magnesium sulfate salt to take for local raw material as Karakalpakstan mine serpentinite mineral again work issue modern science and real work in the release separately place holds .

**Key words**

thermal machining , magnesium oxide, serpentinite , sulfate acid , physicochemical thills , magnesium sulfate ,



**Introduction**

Serpentinite  $Mg_3Si_2O_5(OH)_4$  – a natural mineral rich in magnesium material calculated, composition mainly lizardite, antigorite, chrysotile from mineral organization found. Serpentinite world along widespread to be North In America, South American territories, Russia Ural in the mountains, in China, in Kazakhstan, in Europe in countries and Medium Asia countries and In Uzbekistan big reserves there is.

Magnesium sulfate Calcination of serpentinite at  $900^\circ C$ , then sulfate acid with parsing through is taken. Taken solution up to  $-5^\circ C$  cooled and from it magnesium sulfate crystallizes [1]. These substances, themselves in turn, chemistry industry all in the fields wide [2]. Also, serpentinite magnesium salts and get a bottle of liquid for complex again work opportunity indicating method also suggested [3] We have in our research serpentinite at  $800^\circ C$  for 30 minutes during thermal processing resulting in 50% productivity we achieved and crystallization from  $+5^\circ C$  to  $-1^\circ C$  during the process from the temperature using high magnesium good quality crystal to take successful divided.

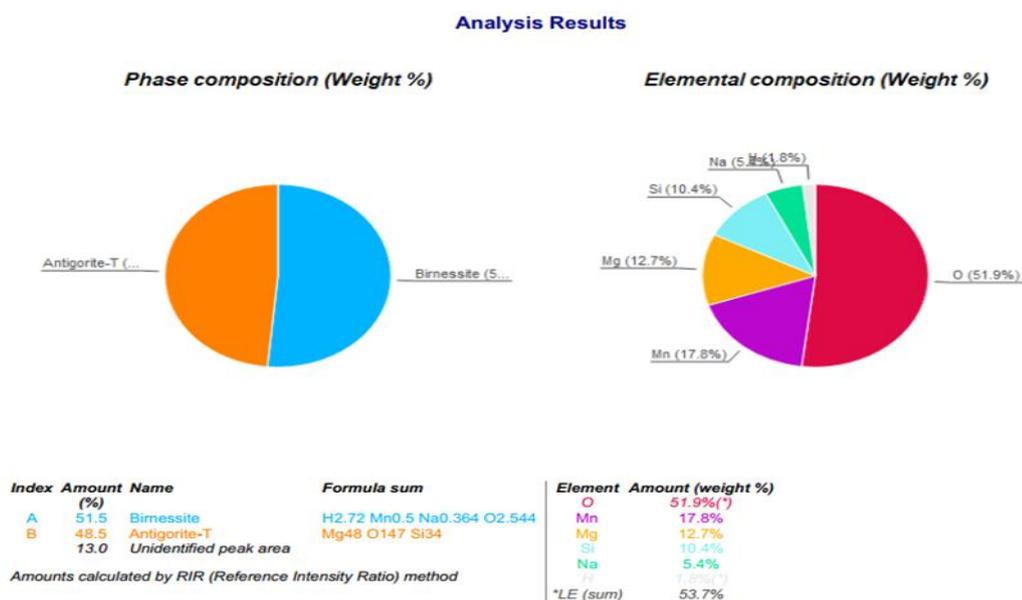


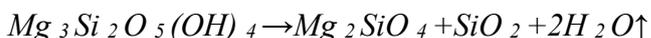
Figure 1. Initial serpentinite X-ray.

Radiograph analysis results initial serpentinide mineralogical composition mainly birnessite — 51.5% and antigorite — 48% of minerals consists of that showed (Figure 1).

**Research methodology** this research at work Karakalpakstan mine serpentinite spherical at the mill crushed and 30 minutes at  $800^\circ C$  during thermal processing was given.

**Table 1**

Sample No.	Temperature, °C	Heating time, $\tau_{min}$	The mass of the obtained mineral, g	After burning, g	Mass lost, g
1.	800	30.	400.50	370.65	29.85



$$\frac{2H_2O}{Mg_3Si_2O_5(OH)_4} \approx 13\%$$

Thermal processing in giving hydroxyl groups are released. In this reaction, H<sub>2</sub>O is released in the form of vapor it comes out .

Thermal processing to give process Germany Worked in the Republic in 2016 "NOBERTHERM" brand issued muffled in the oven take went .

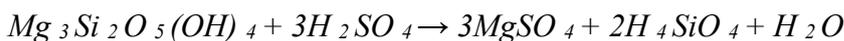
**Thermal processing from given next taken sample density**

**Table 2.**

Temperature , °C	From burning taken sample time , τ <sub>min</sub>	Density in free state g/cm <sup>3</sup>	Pressed in the state Density g/cm <sup>3</sup>
800	0	1,452	0.954
	30	1,321	0.734

Here volumetric bulk density temperature increase with decreases - this dehydration and hollowness with depends .

Thermal processing from given then 20% 80 normal sulfate acid solution with 67.5 °C for 30 minutes during serpentinite to break up for reaction process done increased .



Reaction after completion then The suspension was immediately separated into pulp and filtrate by vacuum filtration. Magnesium and more iron vinegar from acid outside all from the test past in acids melted without more harvest [4]. From filtering then filtrate ammonia gas using neutralized at pH 6-7, neutralization in the process metal ions also precipitate fall observed [5].

**Serpentinite sulfate acid in solution decomposition process technological parameters impact studied**

**Table 3**

Sample number No.	H <sub>2</sub> SO <sub>4</sub> concentrate ink	Sulfuric acid standard %	Fragment niche temperature °C	MgO yield %		Filtration rate kg/m <sup>2</sup> h		Precipitation moisture % after 1st wash	The Q:S ratio in the reaction mass
				liquid	hard	In the solid phase	in the liquid phase		
1.	20	80	67.5	81.23	49.29	18.62	111.0	41.78	7.06

Filtering in the process sulfate acid concentration and I'm sorry magnesium at the exit important importance yes , from this outside reaction temperature , filter paper and vacuum level also important is . In this 3rd table MgO of output 49.29% in pulp , liquid in phase and 81.23 % organization This is It was found that 20% of 80 are normal . sulfate acid solution with take visited in experience filtering process difficult It's late .



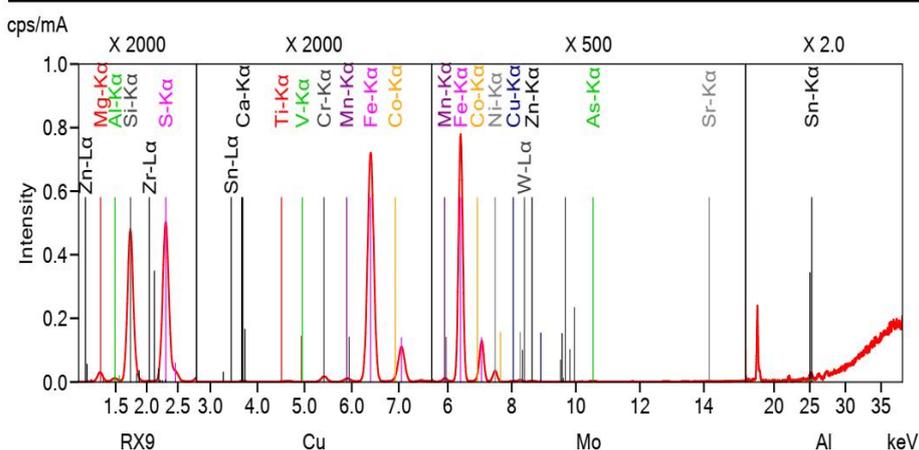
From filtration separated pulp and filtrate high effective energy dispersed X-ray spectrometer analysis

Table 4

First from the sample No.	Mineral content of pulp %.							
1.	Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	SiO	SO <sub>3</sub>	MgO	ZrO	Cr <sub>2</sub> O <sub>3</sub>	
	5.91	2.31	47.9	18.0	18.2	0.132;	0.246	
Mineral content of the filtrate %								
2.	Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SO <sub>3</sub>	MgO	ZrO	Cr <sub>2</sub> O <sub>3</sub>	H <sub>2</sub> O .
	1.12	1.95	0.137	22.9	4.88	0.0978	0.0393	68.7
the 1st wash taken pulp content %								
3.	Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SO <sub>3</sub>	MgO	ZrO	Cr <sub>2</sub> O <sub>3</sub>	
	7.13	2.27	61.9	2.35	16.1	0.128	0.275	
the 1st wash taken filtrate content %								
4.	Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	SO <sub>3</sub>	MgO	ZrO	Cr <sub>2</sub> O <sub>3</sub>	H <sub>2</sub> O .
	0.0884	0.539	0.335	4.63	2.09	0.0659	0.0077	92.2

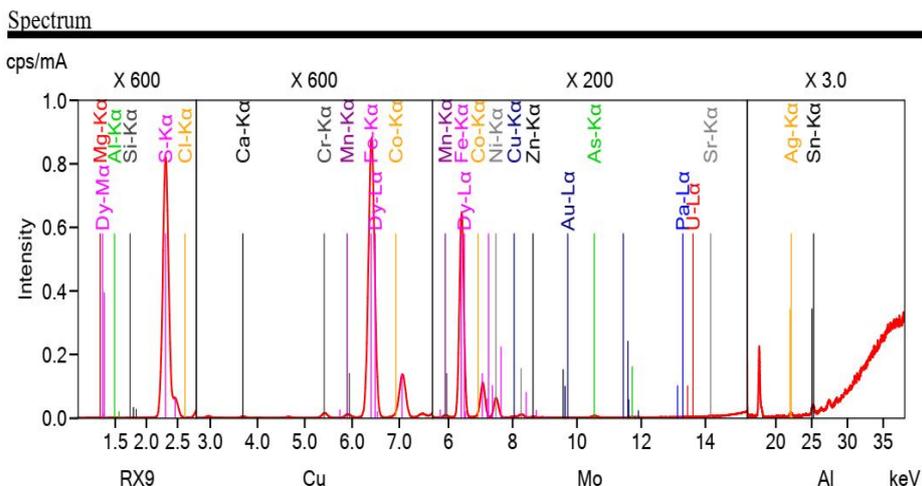
can be seen from this Table 4 It is clear that MgSO<sub>4</sub> of amount in solution more , solution cooling through or by evaporation, MgSO<sub>4</sub> crystals are separated as precipitates. In addition to MgSO<sub>4</sub>, Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>, and SiO<sub>2</sub> are dissolved in the solution. less in quantity past are , these are ammonization in the process sediment in case separates .

Spectrum



a





b  
Figure 2. (a) Pulp and (b) the filtrate X-ray fluorescence experiment 1 results spectra

Various at temperatures density and viscosity determination

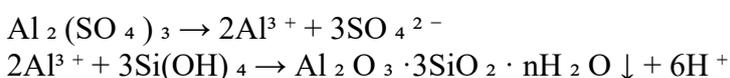
Table 5

Thermal processing given	Acid concentration on concentration on H <sub>2</sub> SO <sub>4</sub> , %	Acid standard H <sub>2</sub> SO <sub>4</sub> %	Sample	Density, ρ g/cm <sup>3</sup>				Viscosity, ✓ m <sup>2</sup> /sec			
				20° C	40° C	60° C	80° C	20° C	40° C	60 C	80 C
800 °C 30 min.	20	80	67.5° C 30 min H <sub>2</sub> SO <sub>4</sub>	1,23 6	1,22 7.	1,20 8	1,19 9	14.5 5	11.3 2	8.2 7	6.8 3

Sample filter The density decreases as the temperature increases from 1.207 g/cm<sup>3</sup> at 20°C to 1.162 g/cm<sup>3</sup> at 80°C . The viscosity also decreases from 26.9 m<sup>2</sup>/sec to 8.98 m<sup>2</sup> /sec. When the reaction temperature increases from 67.5°C to 90°C, the density of the liquid increases from 1.207 g/cm<sup>3</sup> at 20°C to 1.243 g/cm<sup>3</sup> , and the viscosity decreases from 26.9 m<sup>2</sup> / sec to 4.75 m<sup>2</sup> / sec at 20°C, depending on the reaction temperature . to at temperature is decreasing .

**Result and discussion** Silicon separation for Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> and using Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> high at the level sediment harvest to be help gave [6,7]. Taking visited from experience this known It turns out that Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> and Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> reagents designated 2–3% of the amount excess to be spent take it came , this and working in the release economic in terms of effective not to be possible [8].

Reaction equations as follows is expressed as :



Here silicon and aluminum in the form of a hydroxide gel It 's drowning .



Scientific at work serpentinite mineral Mg content to the solution transfer for opposite flowing wash method [ 9] Suspension Bunsen sausage on top of The installed filter is poured into the funnel, then after the pressure in the flask reaches 8-9 mPa, the vacuum pump is periodically turned on during operation without affecting the filtration rate. deletion it is possible , this vacuum from the pump previous rubber to the flute installed screw with managed . This method filtration time in reduction help gives , as well as their in the laboratory worked at the time noise reduces and additional accordingly electricity energy According to the results of the study , as the temperature in the reactor increased, the reaction of serpentinite with sulfuric acid increased. This magnesium ions to the solution to pass level with explanation possible .

### Conclusion

Next take visited our experience as a result initial serpentinite  $H_2SO_4$  with thermal again worked serpentinite relatively less effective in a way to react entry and less in quantity magnesium sulfate harvest to be ( sulfation - calcination ). In the study reaction conditions — acid concentration , temperature and of time exit to the efficiency noticeable impact to show studied . Take visited from experience this known It was , the disintegration from the reaction then the product at a temperature of 400–800 °C between thermal incineration into the air many amount of  $SO_3$  gases divorce determined .

Thermal processing given serpentinite 20% 80 normal sulfate acid solution with 67.5 °C for 30 minutes during 82% magnesium by weight oxide harvest It was found that temperature has a positive effect on the release of some magnesium in the reaction . and acceptable was considered a parameter .

Due to the washing process, the acid residues have passed into the filtrate . Reaction As a result,  $MgSO_4$  is formed . Filtrate neutralized metal oxides to the point dropped and to suspension water adding filtration through liquid received . Received magnesium at 5-1°C from liquid sulfate salt crystallized . Yield  $MgSO_4$  pharmaceutical and village farm and chemistry industry for cheap product working release , our country economy and our people marriage level to improve wide road opens .

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