DOLOMITE ENRICHMENT OF WAUSH MINE BY FLOTATION METHOD

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Abstract. *It was determined that the Paleogene deposits of the Vaush mine, located in the territory of Navoi region, consist of conglomerates, quartz sand, clay, marl, dolomite and its various forms. Research and testing work consists in researching the production of pure dolomite at the level of demand by enriching the mixed minerals in the Waush mine. During the experimental tests, samples were taken from 3 horizons of the mine and flotation method was used for their enrichment.*

Keywords: *waush mine, dolomite rock, flotation, flotation agent, soapstock, UGK, quartz sand, clay, concentrate.*

Introduction. Dolomite or dolomite sedimentary rock is one of the types of minerals belonging to the class of carbonates. At least 95% of the dolomite rock consists of dolomite, which forms the parent rock.

Dolomite is characterized by its softness compared to other silicate compounds. When dolomite is dropped from a low concentration solution of hydrochloric acid, it forms a very weak foam. This property is widely used in separating it from limestone, because when such acid is dropped on limestone, it quickly forms foam on the surface of limestone. Usually, dolomite takes on a characteristic yellowish-brown appearance due to the presence of iron (II) compounds in its natural decay (decomposition).

As part of the research, the Vaush dolomite mine located in the Navbahor district of the Navoi region was studied in order to develop a method of beneficiation of dolomites found in local mines.

It was determined that the Paleogene deposits in the Waush mine consist of conglomerates, quartz sand, clay, marl, dolomite and its various forms. Waush dolomites are white in color, yellowish in some places, quite soft, and differ from other deposits in terms of their chemical composition. Dolomite rocks of Waush mine are geologically divided into two horizons. The first horizon consists of pure white dolomites. The upper part is chemically weathered to a light gray color, and the fracture surface is white. Dolomites of the first horizon have a relatively loose and flour-like structure. When struck with a hammer, a clicking sound is heard. This indicates that they are very porous.

The sandy dolomites of the second horizon are light gray, monostructural, relatively dense, and clearly distinguished by the presence of small quartz grains. The size of quartz grains is in the range of 0.5-0.7 mm and is evenly distributed in the composition of the rock.

Samples were taken from 3 separate layers of geological openings of the mine. The samples taken from the mine are sorted by the method of "reduction of the sample by dividing into quarters" (quartovanie).

Natural magnesite from Waush mine contains dolomite, calcite, quartz, iron and other impurities. Especially harmful are mixtures of minerals with silicon and calcium oxides, which form easily soluble compounds after fire, which drastically reduces the quality of refractories. High-quality refractory materials can be obtained from magnesite concentrates containing a minimum amount of impurities, mainly CaO and CuO_2. Removal of these impurities, especially silicon, is the main task of magnesite ore beneficiation.

Two methods have been developed for beneficiation of magnesite: separation in heavy suspensions and flotation. Heavy suspensions cannot provide the necessary separation of magnesite and dolomite due to the close density of these minerals. Flotation is considered an effective method for deep enrichment of magnesite with many small grains and fine intergrowth of minerals.

Prior to the flotation process of Waush mine dolomite ores, a sample of the same weight taken from 3 different horizons of the mine was first crushed and crushed. then sieved No. 0.8.

Dolomite is a brittle, easily scratched, water- and frost-resistant, fire-resistant carbonate sedimentary rock. Based on its composition and main physical and technical properties, dolomite is used as a finishing material in construction and as a filler in the production of other construction materials, raw material containing magnesium in the chemical industry, flux in metallurgy, basic raw material in glass production, raw material in the production of magnesium in metallic form. It is widely used as a raw material for obtaining magnesia refractory materials, as a filler for improving the composition of the soil in agriculture, and in the production of paper and rubber-plastic products[1].

Dolomite and magnesite have the same crystal structure, similar surface properties and flotation properties. That is, magnesite and dolomite are salt-type minerals that exhibit hydrophilic behavior. The two most commonly used methods for processing dolomite ores are heavy-medium separation and flotation [2].

Dolomite and magnesite are salt-type minerals that share the same crystal structure and exhibit flotation behavior. It is a gravity and flotation method used for beneficiation of dolomite and magnesite ores. It is known that the surface properties of silicate, quartz and various iron minerals in the mineral composition are different. They can be easily separated by flotation [3].

Flotation was carried out in two different flotation reagents, the first method was carried out as follows: 330 g and 2000 ml of water were mixed with dolomite powder and water in the ratio of 1:6 and put into the chamber of the floatation machine. In the flotation chamber, the solution was mixed for 1 minute, then 1 ml of collecting flotation agent (soap stock) was added. Then it was mixed for another 2 minutes. With the help of an air collector, air was supplied to the chamber. A film is formed on the surface of the bubbles and the dolomite particles are attached to it and brought to the surface of the water. After collecting the foam, 1 ml of flotation reagent was added to the flotation machine chamber and mixed. After air was introduced into the chamber, foam began to form again. After collecting the foam, 1 ml of flotation agent was added to the mixture in the chamber and mixed. A small amount of foam began to form after air was introduced into the chamber, but the quality and volume of the resulting foam differed from the original foam. After 2-3 minutes, foaming has almost stopped.

The above flotation process was carried out in 3 steps and the flotation time was 20 minutes. As a result, 141 g of enrichment was obtained. The following table shows the parameters of the flotation process:

Dolomit 330 gr	Water consumption ml	Sopstok-100 % ml	Time, minutes		Rotation speed	Air pressure	Concentrate output		Waste	
			mixing	Flotation time			gr	%	gr	%
1st enrichment	2000	1	1	10	0,6	20÷40	100	30,30	179	54,24
2nd enrichment	600	1	0,5	5			41	12,42		
3rd enrichment	600	1	0,5	5						
total	3200	3	2	20			141 gr	42,72 %	179 gr	54,24 %

Dolomite powder and water were mixed in a ratio of 1:6 with 330 g of coal and 2000 ml of water and placed in the floatation chamber. The solution was mixed in the flotation chamber for 1 minute, then 0.5 ml of UGK flotation reagent was added. Then it was mixed for another 1 minute. With the help of an air collector, air was supplied to the chamber. The formed bubbles began to come out in a state where small and dolomite particles were attached. The foaming process lasted 10 minutes. The quality and volume of the foam formed at the end of the process differed from the initial foam.

The above flotation process was carried out in 1 step. As a result, 166 g of enrichment was obtained. The following table shows the parameters of the flotation process:

Dolomit 330 gr	Suvsarfi ml	UGK-100 % ml	Time, minutes		Rotation speed	Air pressure	Concentrate output		Waste	
			mixing	Flotation time			gr	%	gr	%
1st enrichment	2000+700+700	0,5	1	10	0,6	20÷40	166	50,3	146	44,24
total	3400	0,5	1	10			166 gr	50,3 %	146 gr	44,24 %

a) b)

Figure 1. Dolomite mineral flotation process. a) enrichment process of dolomite with soapstock flotation agent. b) enrichment process of dolomite with UGK flotation agent.

The territory of our republic is rich in dolomite deposits and there are also geologically unexplored reserves, conducting scientific research aimed at their rational and effective use and developing technologies for deep processing of dolomites are important tasks for research scientists..

Conclusion

In summary, the beneficiation of Waush mine dolomite ore depends on the impurities contained in the ore. Common methods of dolomite ore beneficiation include gravity separation, flotation, magnetic separation, incineration, and leaching. Among these methods, it is effective to use the flotation method for ores mixed with quartz grains. In a research study, it was found that UGK flotation agent is highly effective in flotation of quartz sand and other harmful additives in dolomite ores. The chemical and mineralogical composition of the dolomite obtained from the flotation process of the Waush mine dolomite rock meets the requirements for industrial dolomites.

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