

UNITED STATES PATENT OFFICE

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CONCENTRATION OF KYANITE

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1 Claim. (Cl. 209—166)

The present invention relates to an improved process of concentrating kyanite from its ores by froth flotation.

In a co-pending patent application, assigned to the same assignee as the present application, by Nathan K. Karchmer and Charles E. Heinrichs, Serial No. 349,128, filed August 1, 1940, there is described a process of concentrating kyanite from its ores, which is characterized by a first step of conditioning an aqueous pulp of the kyanite ore in a conditioner by adding to and admixing concurrently with the pulp a higher fatty acid (such as oleic acid) and sodium silicate as cooperating agents, and the second step of subjecting this conditioned pulp in froth flotation cells to froth flotation, without the addition of further agents, to separate a concentrate of kyanite.

The present invention, which may be considered an improvement upon the above-mentioned process, is the result of the discovery that by pre-treating the kyanite ore with caustic alkali and then washing out the caustic alkali, the kyanite may be successfully concentrated by froth flotation in a pulp containing a fatty acid, possibly with slight quantities of pine oil or other frother at the discretion of the operator.

It is unnecessary to theorize about what the pretreatment with alkali does to the particles of the kyanite ore, but the fact is that for some reason this alkali pretreatment and subsequent washing out of the alkali leaves the ore particles in such condition that the kyanite particles are much more amenable to froth flotation with a higher fatty acid than is the case with ores that have not been so treated. Sodium hydroxide (caustic soda) in the quantity hereinafter mentioned, has been found to be a satisfactory alkali for use in the pre-treatment of the kyanite ore. Other caustic alkali, such as potassium hydroxide (caustic potash) may be used. Oleic acid, in the quantity hereinafter mentioned, has been found particularly useful as a higher fatty acid in the carrying out of the process, but any other fatty acid having at least twelve carbon atoms can be used.

In practicing the process and obtaining the excellent results hereinafter set forth, Baker Mountain kyanite ore was comminuted to suitable particle size, which was mostly minus 35-mesh, and was largely deslimed. The comminution is preferably accomplished in stages so as to reduce the slimes to a minimum. The comminuted ore was then agitated in a pulp at approximately 70% solids with 2.00 lbs. per ton of ore of caustic soda for about three minutes. After thus being pretreated with alkali, the ore was washed substantially free of said alkali; and in a pulp at approximately 70% solids was conditioned with oleic acid (red oil) in the amount of 0.45 lbs. per ton of ore and with a frother consisting of pine oil (P. T. 101) in the amount of 0.14 lbs. per ton of ore. The mixing time was two minutes. The ore thus conditioned was subjected to froth flotation in a froth flotation machine with the following results:

title size, which was mostly minus 35-mesh, and was largely deslimed. The comminution is preferably accomplished in stages so as to reduce the slimes to a minimum. The comminuted ore was then agitated in a pulp at approximately 70% solids with 2.00 lbs. per ton of ore of caustic soda for about three minutes. After thus being pretreated with alkali, the ore was washed substantially free of said alkali; and in a pulp at approximately 70% solids was conditioned with oleic acid (red oil) in the amount of 0.45 lbs. per ton of ore and with a frother consisting of pine oil (P. T. 101) in the amount of 0.14 lbs. per ton of ore. The mixing time was two minutes. The ore thus conditioned was subjected to froth flotation in a froth flotation machine with the following results:

Product	Weight	Kyanite		Quartz		Acid sol.	Kyanite recovered
		Percent	Percent	Percent	Percent		
Feed.....	100.0	33.82	64.69	1.38	100.0		
Conc.....	33.2	91.78	5.33	2.89	90.1		
Midd. #2.....	3.4	29.51	67.20	3.29	3.0		
Midd. #1.....	10.8	10.54	88.10	1.36	3.0		
Tail.....	52.6	2.50	97.20	0.30	3.9		

From the above data, it will be noted that from ore containing 33.82% kyanite there was obtained a kyanite concentrate having a grade of 91.78% kyanite, with 90.1% recovery of the kyanite in the ore. It will also be noted that these excellent results were obtained by the use of only a small amount of fatty acid as the only flotation agent, and without any depressing agent.

What is claimed is:

A process of concentrating kyanite from its ores, which comprises comminuting the ore to suitable particle size and desliming the same, pretreating the comminuted ore by agitating it in a pulp containing caustic alkali, washing said alkali away from the ore, agitating the thus alkali-treated and washed ore in a pulp free from any depressing agent and containing oleic acid as the only flotation agent, and subjecting the thus conditioned pulp of kyanite ore to froth flotation to separate a concentrate of kyanite.

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