

Froth Flotation

Different processing methods are used by mining companies to separate valuable minerals (ore) from other unwanted “waste” minerals (gangue). The froth flotation process uses special chemicals and air bubbles to float selected minerals to the surface for collection.

Background

The minerals industry relies on the process of froth flotation in the separation of many valuable minerals from the ore bodies

FROTH FLOTATION is the process where the crushed rock and water mixture coming from the grinding mill, goes into a tank where additional water and some chemicals are added. It is stirred and air is bubbled through it.

This process utilises the behaviours and properties of certain reagents in the separation of the concentrate from the crushed ore.

The two types of reagents used are:

- FROTHERS which create the froth
- COLLECTORS which attach to the mineral to be floated off.

The Experiment

Aim: To recognise the various stages which result in separation being achieved by flotation; to deduce from observations, what the properties of the reagents used were.

Equipment & chemicals:

- 4 test tubes, 4 stoppers, test tube rack
- Samples of crushed galena and quartz, spatula
- Distilled Water, Xanthate, Frother

Procedure:

Using the test tube series (the distilled water, frother and collector provided) proceed as follows recording your observation for each step on the accompany sheet.

Step 1

- Take test tube 1 stopper and shake containing distilled water.
- Take test tube 1 and now add the pre measured quantity of xanthate (collector). Stopper and shake.
- Take the distilled water and xanthate solution in test tube 1 and add the pre measure quantity of frother. Stopper and shake.

Step 2

- Take test tube 2 containing distilled water and crushed quartz, cork. Stopper and shake.
- Now add to the test tube 3 solution the pre-measured quantity of xanthate (collector). Stopper and shake.
- To this solution add the pre-measured quantity of frother. Stopper and shake.



Step 3

- Take test tube 3 containing distilled water and crushed galena, cork. Stopper and shake.
- Now add to test tube 2 the pre-measured quantity of xanthate (collector). Stopper and shake.
- To this solution add the pre-measured quantity of frother. Stopper and shake.

Step 4

- Take test tube 4 containing distilled water, crushed quartz and galena. Stopper and shake.
- Now add to test tube 4 the pre-measured quantity of xanthate (collector). Stopper and shake.
- To the solution in test tube 4 add the pre-measured quantity of frother. Stopper and shake.

Results

TABLE 1: Observations of Mixtures

Test Tube	Test Tube Contents	Observations
1	distilled water distilled water + xanthate distilled water + xanthate + frother	
2	distilled water + quartz distilled water + quartz + xanthate distilled water + quartz + xanthate + frother	
3	distilled water + galena distilled water + galena + xanthate distilled water + galena + xanthate + frother	
4	distilled water, crushed quartz + galena distilled water, crushed quartz + galena + xanthate distilled water, crushed quartz + galena + xanthate + frother	

Discussion

What can be concluded from these observations?

What was the action of the frother?

What does the collector (xanthate) do?

How could this process be used in the separation of minerals from the ore body.

Conclusion

Summarise your findings from this experiment.

