FOAM FLOTATION PROCESS, STAGES AND TECHNOLOGICAL PARAMETERS

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Abstract. *The article is about foam flotation process and its application. This includes the processes that follow the metallurgical process for extraction. After mining processes in the mine, the rock is taken to beneficiation plants. metals in their pure state from their ores: especially for sulphide ores. Foam flotation is usually one of the steps is performed prior to dissolution and is related to the surface chemistry of the fluids and minerals being separated. This the process requires certain adjustments involving various components. Surfactants play the most important role. Different types of surfactants are used in different ways and each of them plays a crucial role: collectors, foams, foam stabilizers, depressants and activators, pH regulators, etc. The process of flotation of sulphide ores It should be studied with chemical and electrochemical phenomena taking into account interphase energies. Its wide application in the industrial field, this process is the flotation of iron ores, and there are two types: direct and reverse flotation. The next one again based on two different types such as cationic and anionic reverse flotation. All these processes are of different types flotation reagents are used. Another application is the separation of malachite and azurite ores using sulfidization flotation.*

Keywords: *flotation, absorbed, surfactants, chemical substances, absorption, activators, chemical processes, depressants, metallurgy.*

Introduction

Foam flotation is a widely used metallurgy techniques used in various fields such as mineral processing, wastewater treatment, etc. At the beginning of the 20th century, it is modern technological innovation was first used in mineral processing. In it, the process of extracting metal a state pure of its ore on a large scale of any participation physical or chemical means is called metallurgy. Metal ores are formed by ore genesis and are obtained by mining. Mining metallurgy actually consists of extraction of essential metals from ore and separate processing of mined raw metals is a cleaner form and process. Various techniques of metallurgy:

Hydrometallurgy: In this technique, aqueous the solution is used to extract metals from ores. For example, Washing; a widely used technique for conversion converts metals into soluble salts in aqueous media.

Electrometallurgy: It is a metallurgical process occurs in the form of an electrolytic cell.

Pyrometallurgy: It involves high temperature processes. Here it is done with thermal treatment Ores and minerals bring about some physical and chemical transformations in materials for recovery of valuable parts. This is pyrometallurgy includes three different techniques. These are:

Calcination: Here is a thermal treatment method limited air supply to the ores is used for bringing about thermal decomposition.

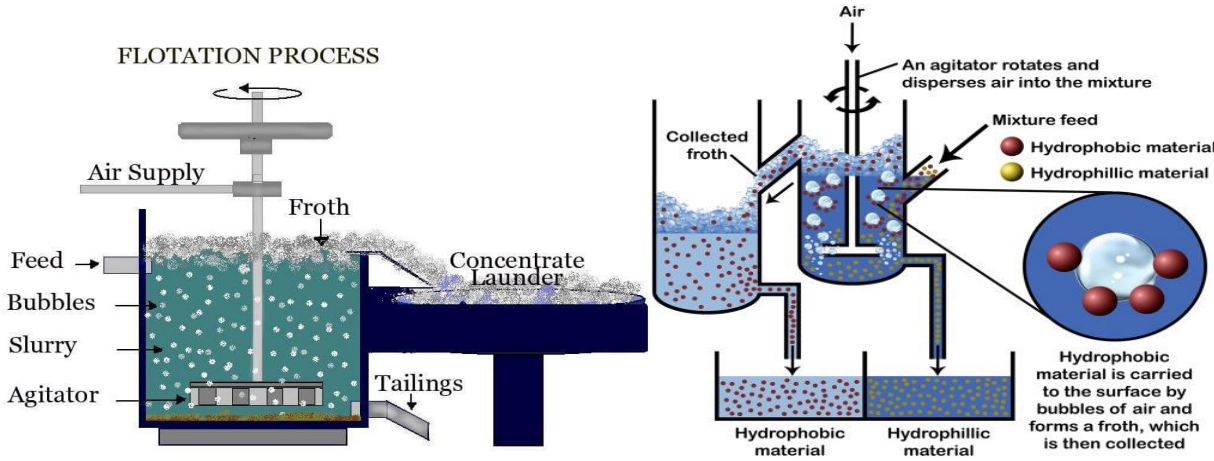
Increasing temperature: In this process, sulfide ores heated to a high temperature in the presence of air.

Smelting: In this process, heat is applied to the ore to obtain base metals such as silver (Ag), iron (Fe), copper (Cu) and others. Often before roasting ore (usually sulfide ores) are partially refined using other important the technique is called bubble flotation and it also the topic of our conversation. This is foam flotation the cheapest technique of widespread metallurgy used for low-grade sulphide ore all over the world concentration to remove impurities.

Flotation is basically a separation technique based on hydrophobic insulating surface selectivity materials from the hydrophilic part. A lot This technique uses surface-active reagents in turn selectively changes the hydrophobicity of to achieve a wide variety of mineral surfaces separation processes are observed.

Detailed explanation of foam flotation process

The basic principle of foam flotation process due to differences in wetting properties of sulphide ore and mixtures (or may not contain non-sulphide ores).



Picture. 1. Flotation process

Components of the flotation system (Picture.1):

Cell: The container containing and containing the propeller able to hold solids in suspension. Besides often provides air for air bubbles collision.

Feed: A pipe used to supply materials .e. flotation pulp to the cell.

Flotation pulp: a mixture of solids (must be separated), the ratio of solids to water is approximately 1:3, by weight, usually suspended in water.

Surfactants: Various surfactants are used different stages of this process. They are called collectors, foams, etc.

Regulators: These are called depressants, activators, pH regulators, etc.

Air Supply: Air is absorbed by suction propeller.

Process and parameters

Then the suspension (not a solution, as there is no ore soluble) powdered ore and water are prepared and taken to a large tank. After that, collectors and foam stabilizers gradually added to it. Collectors begin to surround the area each particle of ore. With the help of a rotating paddle, that is, a propeller, the whole suspension is triggered. An oil foam containing ore is formed particle. It comes to the surface as it is by flotation lighter than mixtures. Finally, the foam is cleaned and dried recovery of ores. Impurities remaining in the water also collected separately in the tank. Sometimes two metals can be present in an ore sulphides, in such cases, to separate them from the oil content and water should be controlled and depressant worked From various research experiences, this determined that metal-sulphide ores are natural oleophilicity (oil-loving nature) or hydrophobicity (nature that hates water) e.g. galena (PbS). Without a

collector galena flotation can be done with moderate oxidizing potential. For this, the hydrophobic part of Galena surface can be elemental sulfur or lead polysulfide.

Surfactant chemicals

A solid to be floated must have a surface some hydrophobic properties; if not, you should treated with some hydrophobicity special chemical reagents. These reagents are known as surfactants or surfactants. The is called the interaction of surfactants on the surface surface chemical reactions. Surfactants play a dual role role in flotation:

a. Absorbed at the mineral-water interface and thus making the surface of selected minerals hydrophobic in nature.

b. They affect the kinetics of the bubble-mineral attachment.

Surfactants can be divided into two groups. They are monopolar and multipolar. Every group can divided into three classes, for example:

1. Thio compounds mainly act as collectors metal sulfides.

2. Non-thio, non-ionizable compounds can affect both as collectors and foams.

3. Nonionic compounds, some mainly foamy and others can act as a depressant; as flocculants and even activators.

Nowadays, some newly developed giant Surfactants are very demanding to have clear controlled chemical structures. It is prepared through these two-step thiol-ene "Absorption" reactions are easily realized.

Addition processes of depressants and activators

When multiple sulphide ores are present cell, depressants are used to lower certain minerals and promote the desired selective flotation minerals. In such selective flotation processes the concentration of depressants should be controlled carefully. Example: sodium cyanide (NaCN). If a mixture of galena (PbS) and sphalerite (ZnS), both of which can be oil-wet, so depressant is used.

The reaction involves: $4NaCN + ZnS \rightarrow Na_2[Zn(CN)_4] + Na_2S$

Now it is soluble and the resulting complex is does not swim It floats to the surface only with PbS foam. Slime is a natural depressant.

Activators are activating substances flotation property of ore particles previously depressed using depressants. Example: $CuSO_4$.

The reaction involves: $Na_2[Zn(CN)_4] + CuSO_4 \rightarrow ZnS$

Sulfide flotation processes

Flotation processes of sulphide minerals are popular and complex. It explains the various flotation applications collectors, foams, depressants and such reagents activators etc. have already been discussed. Adsorption of collectors to sulphide mineral occurs by two different mechanisms. They are:

Chemical processes, as a result of which presence of chemisorbed metal xanthate on mineral surface.

Electrochemical processes that provide. oxidation product, i.e. hydrophobic species adsorbed by the mineral surface.

Chemical processes in flotation

This mechanism is also called chemisorption events. It is observed to occur with some specificity such minerals as: galena (PbS), chalcocite (Cu_2S) and sphalerite (ZnS). Now in this mechanism the following stages are observed (for galena):

I: $PbS_{(s)} + 2O_{2(g)} \rightleftharpoons PbSO_{4(s)}$

Sulfide is oxidized to sulfate when dissolved oxygen in the pulp.

II: $PbSO_{4(s)} + CO_{2(g)} \rightleftharpoons PbCO_{3(s)} + SO_4^{2-}$

Carbonate ions present in the pulp, participates in the substitution reaction with lead sulfate (PbSO4).

III: $PbCO_3(s) + 2C\text{-}(g) \rightleftharpoons PbC2(s) + CO_3^{2-}$

$PbSO_{4(s)} + 2C^-_{(g)} \rightleftharpoons PbC_{2(s)} + SO_4^{2-}$

$Pb(OH)_{2(s)} + 2C^-_{(g)} \rightleftharpoons PbC_{2(s)} + 2OH$

Here exchange reactions occur again. between xanthate ion (C-) and carbonate, sulfate and hydroxyl ions (depending on pH) in line.

IV: In this stage, large amount of lead precipitation xanthate is observed on the mineral surface. pH plays an important role in this process recovery of galena. To increase the pH from 8,5 recovery of lead is obtained in the flotation cell decreased by about 9-10%.

Conclusions

Foam flotation is one of the most common mineral processing technologies and is important in the waste management and waste treatment/reclamation industries. It provides simple, relatively inexpensive solutions to environmental problems. DAF/DPAF systems are designed to remove many types of pollutants/wastes by flotation. Products removed include suspended/insoluble solids, animal/vegetable fats, oils, greases, fuels, organic materials, inks, waxes, animal/vegetable products and many others are products. Today, flotation is also widely used worldwide for drinking water, municipal and industrial wastewater treatment/utilization, and chemical treatment of waste. It is believed that flotation will find new potential application areas and become more important in the waste management and recycling/recovery industries in the near future.

a. The flotation process is mainly regulated by the surface chemistry of sessile minerals.

b. For separation of iron ores, foam flotation process is the most important method gives high quality iron from low grade, fine iron disseminated iron ores.

c. Higher flotation rate, simpler reagent use systems and low operating temperatures properties of the cationic reverse flotation process.

d. Flotation of quartz in anionic reverse flotation the technique is carried out using an activator, (usually mucilaginous) in conjugation with an anion collector at high pH value.

Researchers need to continue developments thus, laboratory-scale verification can be linked to more industry-wide results optimization of foam flotation process.

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