Production of Copper and its Industrial Applications

Amit Javier
BOSS International (S.A.R.L.U), Madagascar

About 80 % of primary copper production comes fromlow-grade or poor sulphide ores. After enrichmentsteps, the copper concentrates are usually treated bypyro metallurgical methods. Generally, copper extractionfollows the sequence:1. Beneficiation by froth flotation ofore to give copper concentrate (Optional partial roastingto obtain oxidized material or calcines) 2. Two-stage pyrometallurgical extraction 1. Smelting concentrates to matte2. Converting matte by oxidation to crude (converter orblister) copper 3. Refining the crude copper, usually intwo steps 1. Pyrometallurgically to fire-refined copper 2.Electrolytically to high-purity electrolytic copper. Typicalequipment for crushing to about 20 cm is gyratory andcone crushers. Then wet grinding in semi-autogenous rodor autogenous ball mills takes place. Size classificationtakes is performed in cyclones. In the next step ofbeneficiation, valuable minerals and gangue are separatedby froth flotation of the ore pulp, which exploits thedifferent surface properties of the sulfidic copper ore andthe gangue [46]. The hydrophobic sulfide particles becomeattached to the air bubbles, which are stirred into thepulp, rise with them to the surface of the pulp, and areskimmed off as a froth of fine concentrate. The hydrophilicgangue minerals remain in the pulp. Organic reagentswith sulfurcontaining groups at their polar end, such asxanthates, are used as collectors in the flotation process.Additionally, modifiers like hydroxyl ions (pH adjustment)are used to select different sulfide minerals, for example,chalcopyrite and pyrite. Alcohols are used to stabilize thefroth.

e: spontak@ncsu.edu