

Process Development

In recent years sophisticated beneficiation flow sheets for upgrading lean and complex ores have been developed, as a result of which efficient and versatile equipment and reagents have gone into the mineral processing stream. However, even in the most efficient mineral processing plant, considerable amounts of metallic and other useful minerals are lost in middlings/tailings, which also should be recovered. Some of the important case studies undertaken at R&D institutes are:

- (i) Considerable amount of coal fines are wasted in the coking coal washery rejects. Recently Regional Research Laboratory (RRL) Bhubaneswar developed an efficient process to recover these fuel values from these rejects using column flotation technique. Washery slimes of Sudamdih (-0.5mm) having ash content of around 35% has been brought down to 18% with 75% recovery of heat value. Already as a pilot test facility, 1 meter dia column at Sudamdih washery plant has been installed as per the design of RRL scientists. This can handle 2.5 to 3.0 tonnes per hour of coal and has instrumentation and control required for research studies. As the column has distinct advantages like (a) better product with higher recovery (b) reduction in number of operations (c) no moving parts (d) less capital cost and less floor space required, etc. this will be appropriate to adopt in all the coal washeries, particularly in view of ecology and conservation of coking coal.
- (ii) The technique of column flotation has been suitably demonstrated at Rakha (Bihar) copper mines by the RRL, Bhubaneswar to recover the molybdenum from the copper concentrates in just two stages compared to the conventional cell which takes 9 stages of cleaning. The commercial plant is under installation, relatively at a much less capital cost (Rs. 5 million) as against the conventional plant which needs Rs. 12 million.
- (iii) By jigging Talcher (Orissa) coals for thermal power station, a feed (80% passing through 8.5 mm) having 40% ash is improved to 25% in a single stage where useful heat value recovery is around 85%.
- (iv) In some other cases it has been possible to reduce the ash content from 40 to 20% by column flotation technique at 80% recovery of the combustibles.
- (v) Fertiliser minerals : India has no source of elemental sulphur. However, it is endowed with vast reserves of pyrites. Saladipara deposit of Rajasthan has 25 million tonnes of sulphur locked in pyrites, amounting to 120 million tonnes of ore reserve with about 20% sulphur. This pyrite deposit can sustain a production of 5000 t.p.d. plant for 20 years. Based on this, PPCL has proposed to set up mine, bonification plant, acid plant, phosphatic plant.

From the extensive test works on this pyrite done at NML/Lurgi, Gmbtt, it has been possible to beneficiate the ROM pyrites with 22% sulphur to a concentrate of 40% sulphur with 90% recovery, which is considered to be technically feasible for manufacture of sulphuric acid.