1. BAUXITE

Owing to the high concentration of aluminum in bauxite, the relative ease with which the bauxite can be mined and the aluminum compounds separated, this remains the most widely used raw material for alumina production. With the current global aluminum metal production of around 50 million tons per annum, some 200–300 million tons of bauxite needs to be mined to meet the demand for metallurgical grade alumina.

Most bauxites are found in tropical regions and relatively close to the surface. Typically these bauxites contain between 30 and 60 wt-% aluminum oxides (mainly in the form of the tri- or monohydroxides: gibbsite, nordstrandite, boehmite, and/or diaspore); with iron, silicon, and titanium compounds making up the main part of the remainder. However, the physical properties and mineral composition of bauxite vary widely, which makes the classification of bauxite difficult, and also often requires recovery—and beneficiation—as well as digestion processes to be tailored to a specific resource. One of the most important aspects of the mining operation is to produce a homogeneous material with respect to available aluminum and amount of reactive silica.

The papers included in this section are aimed at addressing the variable mineralogy and structure of bauxite and the impacts this can have on Bayer plant operations. The section also contains papers on mining sustainability and mine rehabilitation, an equally important aspect of the operation. The novel approach to build an over-land bauxite slurry pipeline for transporting the mineral from the mine to the refinery is included as an example of the sometimes challenging logistics of the mining operation. The list of recommended readings contains additional papers on the use of specific bauxite resources and the sometimes required beneficiation and pre-treatment of the mined bauxite to improve the extraction or further processing, which can extend the mine life substantially.

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