

Flow Chart the Refining Process

Topic: Refining

Background Information

The refining process occurs through a series of steps. Alcoa in Western Australia utilises the Bayer method for refining alumina.

What You Need To Do

- Prepare a flow chart of the refining process
- What details can you add to make the flowchart more interesting

Extension/ Alternatives

- Flowchart the mining and refining processes
- Flowchart the mining, refining and smelting process

Curriculum Links

Society and Environment: Investigation, Communication & Participation, Resources

Science: Natural and Processed Materials



refining

Alcoa operates a three-refinery system in WA – Kwinana, Pinjarra and Wagerup – between the capital city, Perth, and the port of Bunbury, 200 km to the south. The Bayer refining process, used by alumina refineries worldwide, involves four steps – digestion, clarification, precipitation and calcination – to extract alumina, the feedstock for aluminium smelters. Alumina is a white granular material, a little less coarse than table salt, and is technically called aluminium oxide. Aluminium does not naturally occur as a metal, but must first be refined from bauxite in its oxide form.



Digestion

Finely ground bauxite (red in colour) is mixed with a hot caustic soda solution to dissolve the alumina from the bauxite. Every six tonnes of bauxite makes two tonnes of alumina.



Clarification

Insolubles, such as sand and mud, are settled and filtered out, leaving a solution of dissolved alumina hydrate.



Precipitation

The liquid containing alumina hydrate is then cooled in large open tanks and seed crystals added, causing the alumina to crystallise out of solution.



Calcination

The alumina hydrate is washed, then heated to remove water, leaving a pure dry alumina in the form of a fine white powder. This is cooled and stored, then shipped to smelters for processing.

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