Recovery of sulphur and calcium carbonate from waste gypsum

NR Nengovhela[1]*, CA Strydom[2], JP Maree[3], S Oosthuizen[4] and DJ Theron[4]

[1] Department of Chemistry, University of Pretoria, Pretoria 0002, South Africa

[2] North West University, School of Chemistry, P/Bag X6001, Potchefstroom 2520, South Africa

[3] Natural Resources and the Environment Operating Unit, CSIR, PO Box 395, Pretoria 0001, South Africa

[4] Sulphide Tech, Pretoria 0001, South Africa

Abstract

Gypsum is produced as a waste product by various industries, e.g. the fertiliser industry, the mining industry and power stations. Gypsum waste disposal sites are responsible for the leaching of saline water into surface and underground water.

The aim of this investigation was to evaluate a process for converting waste gypsum into sulphur and calcium carbonate. The process evaluated consisted of the following stages: reduction of gypsum to calcium sulphide; H_2S-stripping and sulphur production. Thermal reduction showed that gypsum could be reduced to CaS with activated carbon in a tube furnace operating at 1 100 °C. The CaS yield was 96%. The CaS formed was suspended in water to form a CaS slurry. The reaction of gaseous CO_2 with the CaS slurry leads to the stripping off of H_2S gas and the precipitation of $CaCO_3$. During batch studies sulphide was stripped from 44 000 mg/ℓ to less than 60 mg/ℓ (as S).

The H_2S generated in the previous step was then reacted in the PIPco process to form elemental sulphur

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