YUANPING CHEMICAL COMPANY LIMITED

Improved Recovery of Lead Sulphate and Sodium Sulphate (Glauber salt) in the Plumbite Treatment Process and Acidification Process

SUMMARY OF THE OPTION

Yuanping city Chemical Co. Ltd is a middle-sized chemical plant with 1679 staff, located in Shanxi Province in China and is Asia's largest producers of oxalic acid, and also produced products like sodium format and formic acid.

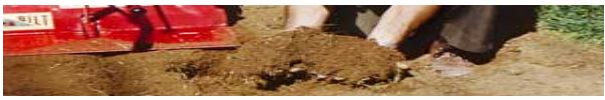
During the in-plant assessment, the Team learnt that lead sulphate, a severe toxic material, is used in the plumbite treatment process and regenerated in the acidification process, and is then carefully recycled to prevent outflow into the environment. Meanwhile, sodium sulphate (Na_2SO_4 or glauber salt) is generated as a by-product in the plumbite treatment process, which is an important raw material for reactive cotton dyeing textile mills and other allied industries and is worth recovering. Increasing the percentage recovery of sodium sulphate will have significant improvement in wastewater pollution load. Therefore, the Team suggested the company to strengthen the recovery of lead sulphate and sodium sulphate. Two specific alternatives were suggested by the company:

Alternative 1: Modifying the plumbite treatment process and acidification process into plumbite-and-acidification combined process. The company finished a small-scale test and a pilot scale test in October 2004. The experiments showed that the plumbite-and-acidification combined process can reduce the process time from previous 12 hours per batch to 5 hours per batch, and saving 65% water consumption. Meanwhile, the application of box-shape pressing strainer prevented lead sulphate from outflow. The next step is to set up a testing plant for the plumbite-and-acidification combined process. The company then chose equipments and ordered the devices, which included box-shape pressing strainer (cost 0.355 million RMB), plumbite-and-acidification combined pot (self-made cost 12000 RMB), elevator (cost 10000 RMB), squeezer (cost 40000 RMB) and centrifugal pump. Total investment for the testing plant was about 0.81 million RMB. Currently, the main barrier is shortage of funding, as modification for the whole factory will need 12 box-shape pressing strainers. And the overall investment including installation, pipelines and electric instruments will cost 12 million RMB (almost US$ 1.5 million).

Alternative 2: Displacing the plumbite treatment process by calcification process, which fundamentally avoids the usage of lead sulphate. The rationale of calcification process is that calcium hydrate instead of lead sulfate ($PbSO_4$) reacts with Na_2C_2O4 to create insoluble calcium oxalate (CaC_2O_4), and then in the follow-up acidification process, CaC_2O_4 reacts with sulphuric acid and gets the reactant of oxalic acid ($H_2C_2O_4$) and insoluble $CaSO_4$. Other processes are similar to the plumbite treatment process. As early as two or three years ago, the company carried out a cooperation research study on calcification process with Beijing Technical University. Recently, the project has finished the laboratory testing, but the isolation technology was not practiced enough for industrial application and cannot be tackled in short time. Furthermore, investment demand is still not clear.

KEY WORDS

China, Chemicals, Chemicals Recovery



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