

Spent Acid from Methyl Chloride Production

The production of methyl chloride produces a stream of spent sulphuric acid contaminated with organics. Chemetics® offers a proven process for the purification and concentration of this spent acid that can be fully integrated with the Methyl Chloride plant.

Background

Concentrated sulphuric acid is used in a methyl chloride plant to remove impurities from the methyl chloride vapour stream exiting the reactor. These impurities consist mainly of Di-Methyl Ether (DME) which is formed as a by-product in the reaction and un-reacted methanol. The spent acid leaving the methyl chloride plant also includes a small amount of Methyl chloride.

The success of the recycling of this spent sulphuric acid stream depends on the effective removal of the organic contaminants from the acid. Methanol, one of the major

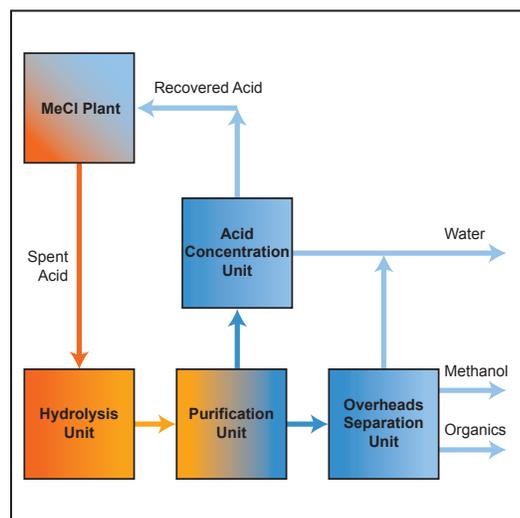
organic contaminants, reacts with sulphuric acid to form Methyl Sulphuric Acid. Methyl sulphuric acid is very difficult to remove from the spent acid and doing so would result in a significant loss of sulphuric acid. Therefore, the first step in the Chemetics process is to liberate the methanol and recover the sulphuric acid in the hydrolysis unit. The second process step, the purification unit, then completely removes the organic contaminants from the acid. This eliminates problems in the downstream Acid Concentration and allows virtually unlimited acid recycle to the Methyl Chloride plant.

Process Description

The spent acid is pumped from storage to the hydrolysis unit where the methanol is liberated from the acid. The acid, now containing only volatile organics, flows by gravity to the Purification Unit where the organic components are removed from the acid using a steam stripping process. The Purification Unit produces a vapour stream containing organics and steam and a liquid stream of clean, diluted sulphuric acid which flows by gravity to the Acid Concentration Unit.

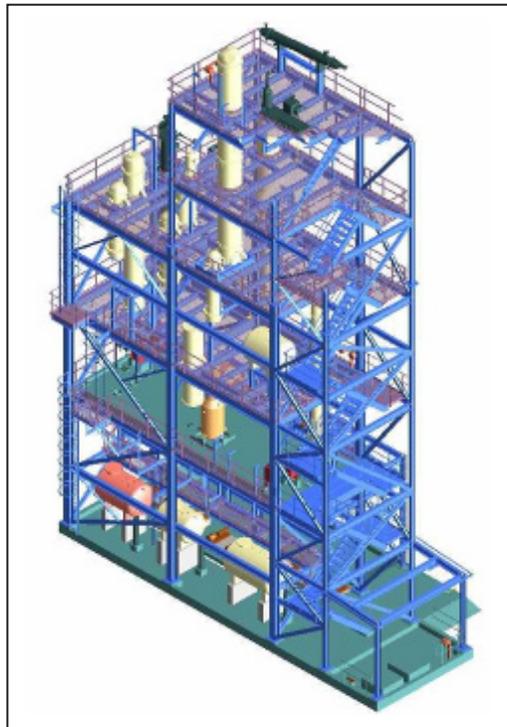
The vapour stream leaving the Purification Unit flows to the Overheads Separation Unit. This unit removes most of the water from the organics vapours. This water is recycled within the process. The organic vapour stream is sent to an incinerator for energy recovery. Optionally, the organic stream can be further separated to recover valuable methanol which is condensed and can be recycled to the methyl chloride plant as a liquid stream.

The steam heated Acid Concentration Unit is operated under vacuum to increase the concentration of the sulphuric acid. Normally two stages are used to achieve the desired product concentration, commonly between 93 and 96 wt%. After cooling, the sulphuric acid is recycled to the Methyl Chloride plant.



Production of highly concentrated product acid requires a high operating temperature; hence steam at 20 barg pressure is required for the Acid Concentration Unit. If this is not available on site, it can be produced within the spent acid plant using hot oil or other heat sources.

Chemetics' process is adaptable to the unique requirements of each client and Methyl Chloride process. Heat integration within the plant as well as maximizing the use of low cost heat sources (e.g. the use of low pressure or flash steam in the stripping column) is routinely incorporated into the design to minimize operating cost. Chemetics has a proven track record providing spent acid concentration plants that are customized to the client's requirements and work seamlessly and fully integrated with the Methyl Chloride plant.



Chemetics Methyl Chloride Spent Acid Recovery Plant Features:

- Virtually complete removal of contaminants from the spent acid in the Purification Unit provides for reliable and trouble free operation of the Acid Concentration unit.
- Extensive use of gravity flow to move sulphuric acid in the plant for ease of operation and improved reliability.
- Use of natural circulation thermosyphon evaporators eliminates the need for pumps in hot sulphuric acid service improving safety and reliability.
- >99% recovery of sulphuric acid for recycle to the Methyl Chloride plant.
- >70% recovery of methanol for recycle to the Methyl Chloride plant improving methanol usage.
- Compact design with efficient use of space resulting in a small foot print while providing excellent access for operations and/or maintenance personnel.