

Spent Acid Treatment

Having developed and commissioned dozens of specialized treatment processes for spent sulphuric and nitric acid, Chemetics® is a proven performer. Our specialized know-how and technology enable us to provide safe, reliable plants that offer the latest innovations in process and equipment design.

Chemetics has developed a number of processes to purify and concentrate Sulphuric and/or Nitric Acid from a large variety of sources. The goal of these is to concentrate the acid, recover valuable by-products and minimize effluents and energy consumption. In many cases, several process options are combined to provide a custom made process.

Chemetics' success is based on its focus on understanding client requirements – all Chemetics spent acid plants and equipment

items are specifically custom designed – so that clients' needs are fully satisfied. Chemetics capabilities range from carrying out Engineering Studies through to the undertaking of turnkey projects.

The following are some examples of the process option in our portfolio. We encourage you to contact us if your specific application is not listed. We would be happy to take on the challenge to develop a process that fits your needs.

Sulphuric Acid Denitration

Spent sulphuric acid from nitration processes (e.g. MNT/DNT/TNT production) or from the production of concentrated Nitric Acid contains various amounts of NO_x, Nitrous Acid and Nitric acid. The SA Denitration process removes these components and recovers the impurities as weak Nitric Acid which can be re-used and NO_x which can be converted to Nitric Acid in a water scrubbing system.

Sulphuric Acid Stripping

Some spent sulphuric acids contain impurities that can be removed by air or steam stripping. Common examples are MNT, DNT, Methanol, Methyl Chloride and Chlorine. The process can incorporate additional equipment to separate and concentrate valuable by-products after they are removed in the stripping process.

Sulphuric Acid Pre-concentration

Some spent sulphuric acids contain impurities (e.g. Ammonium Sulphate) that cannot be removed and prevent the re-use of the spent acid. Common examples are spent acid from Methylmethacrylate and Acrylonitrile production. The Pre-concentration system removes a substantial amount of water from the spent acid before it is thermally decomposed in a Sulphuric Acid Regeneration furnace. This reduces the SAR plant size and lowers the energy requirements.



Sulphuric Acid Concentration (SAC)

Sulphuric acid is concentrated by utilizing a patented vacuum evaporation process. The SAC process can be designed to produce sulphuric acid up to 98 wt%. Large capacities are obtained by using multiple stages in series. For dilute sulphuric acid it is also possible to use a multiple effect process to minimize energy consumption.

Nitric Acid Denitration

Spent Nitric Acid from e.g. the Hydroxylamine production process contains Nitrous Acid. The NA Denitration process removes the Nitrous Acid as NO_x which can be returned to the originating process or recovered as Weak Nitric Acid.

Weak Nitric Acid Concentration (<67 wt%)

Dilute nitric acid can be concentrated using a single or multiple effect distillation process to commercial concentrations of 65-67wt%. This process is designed to minimize the decomposition of nitric acid and produces a colourless product.

Strong Nitric Acid Concentration (>67 wt%)

Nitric acid can be further concentrated using an extractive distillation process to any

desired concentration. This process utilizes either Sulphuric Acid or Magnesium Nitrate to manipulate the nitric acid/water azeotrope. Depending on the application the process can also include a bleaching step to remove NO_x and provide a colourless product. For dilute feed acid (<60 wt%), this process is often combined with a weak nitric acid concentration system.

NO_x Abatement

In many cases a spent acid plant will produce a vapour stream containing NO_x (NO, NO₂, N₂O₄ etc). Discharge of these components is regulated world-wide and hence removal of NO_x from the vent gas is required in all cases. Chemetics offers several options for the removal of NO_x from vent gas streams. These consist of wet scrubbing systems using Water, Sulphuric Acid or Hydrogen Peroxide and catalytic systems using Ammonia or Urea. The water and hydrogen peroxide scrubbing systems produce nitric acid up to 65 wt% concentration that can be recycled. Catalytic systems will reduce the NO_x to nitrogen which can be discharged to atmosphere. The vent gases leaving the NO_x abatement system are able to meet or exceed the emission requirements for NO_x emissions world-wide.

