

Acid Distillation & Fractionation Systems

Acid evaporation and distillation systems can provide several different functions such as acid separation, concentration and purification. The evaporation and fractionation of mixed acid solutions include the following applications:

- ◆ Water removal for acid concentration
- ◆ Fractional distillation of mixed acid solutions
- ◆ Acid purification for removal of dissolved materials
- ◆ Production of high purity electronic grade acids
- ◆ High purity acid production (electronic)



Mixed acid fractionation system that produces a high purity acid distillation of one acid component using a thermal circulating evaporator with fractionation column.

Mech-Chem Associates, Inc. provides a variety of acid evaporation and distillation systems. Systems range in size from 10 GPH to 1,000 GPH units.

Acid Recovery Applications

Waste Acid Steams:

- ◆ Hydrochloric (HCL)
- ◆ Hydrofluoric (HF)
- ◆ Nitric (HNO_3)
- ◆ Sulfuric (H_2SO_4)
- ◆ Methylsulfonic Acid ($\text{CH}_3\text{SO}_2\text{OH}$)
- ◆ Acid Mixtures

Applications:

- ◆ Acid Purification
- ◆ Metals Removal
- ◆ Waste Reduction
- ◆ Reduce Acid Usage
- ◆ Acid Concentration
- ◆ Acid Fractionation

Typical Sources:

- ◆ Acid Etching
- ◆ Acid Pickling
- ◆ Chemical Milling
- ◆ Metal Finishing
- ◆ Metal Processing
- ◆ Stainless Steel Production
- ◆ Chemical Processing
- ◆ Electronics
- ◆ Battery Recycling
- ◆ Mining
- ◆ Specialty/Fine Chemicals

Benefits of Acid Recovery

Of the many options to recover waste or spent acids from manufacturing and metal extraction operations, acid distillation is unique as it can recover and purify the acid while minimizing waste. Acid recovery using distillation can provide a "green technology" with an acceptable Return On Investment.

Acid recovery provides the following benefits:

- ◆ Good Return On Investment (ROI)
- ◆ Reduced Raw Material Costs
- ◆ Reduced Waste Disposal Costs
- ◆ Reduced Shipping Costs
- ◆ Reduced Liability for Transport
- ◆ Reduced Storage Requirements
- ◆ Up to 95% Waste Reduction

Mech-Chem engineers and designs the complete system including integration between the acid recovery equipment and the production operations. The materials of construction for the heat exchangers include graphite, Hastelloy & tantalum. The separators, piping and valves are fabricated using stainless steel, inconel, glass & PTFE lined steel equipment and components.

Aircraft Component Manufacturing

Aerospace manufacturers strip the imperfectly-coated and refurbished aircraft components using hydrochloric (HCL) acid so a new metallic coating can be applied.

The stripping process produces a contaminated acid solution that requires frequent changing and disposal resulting in higher costs for system shutdown, off-site disposal and new HCL acid purchases.

Mech-Chem's acid recovery systems utilize a distillation column that recovers the spent hydrochloric acid and returns it as a clean distilled acid to the strip line.

The system is designed to operate continuously, 24 hours a day, 7 days a week producing a 16% to 20% high purity distilled HCL acid.

Continuous operation of the system is achievable using advanced instrumentation and automation technology that is integrated into a PLC with PC interface.



Thermal Circulating Systems

Mech-Chem designs, fabricates, and installs a variety of acid distillation and fractionation systems for waste acid recovery and chemical processing applications.

The distillation system pictured on the left features a thermal circulating evaporator with a fractionation column that contains a Teflon packing.

The materials of construction varies depending on the specific acid evaporation and distillation application. Materials of construction for the distillation units include stainless steel, inconel, Hastelloy, PTFE lined steel, and glass lined steel.

The materials of construction for the heat exchangers include stainless steel, inconel, Hastelloy, tantalum, ceramic and carbon graphite.

The evaporation and distillation systems are fully instrumented for automated control using a PLC with PC interface.



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