

Acid Recovery Systems

AP-300 to AP-3000 (Large Scale Series)

Mech-Chem Associates, Inc. is now offering larger diffusion dialysis membrane stack modules. These modules are the basis for the AP-300 to AP-3000 series Acid Purification Systems with processing capacities of 300 to 3000 gallons per day.

The AP-300 to AP-3000 acid recovery and purification systems utilize a single feed and control module for the systems. Each system is also equipped with a dual train filtration skid to handle solids removal for the larger industrial applications.

The acid purification system integrates the membrane stack modules with the customer's feed tanks and process equipment. This results in the acid recovery and purification being an integral part of their production or processing operation.

The diffusion dialysis membrane technology is used for acid recovery applications such as plating baths, anodizing baths, acid pickling, metal finishing applications, and production of aircraft components.

These membrane systems are also finding new applications for recovering and recycling the spent acid streams in mining applications, production of rare earth metals, stainless steel finishing, chemical machining and recovery of electronic components.

Acid recovery and purification has several advantages including reduced acid purchases, hazardous waste disposal and operating costs. In addition it increases the life of the acid solution, maintains optimum bath uniformity, and improves product quality.

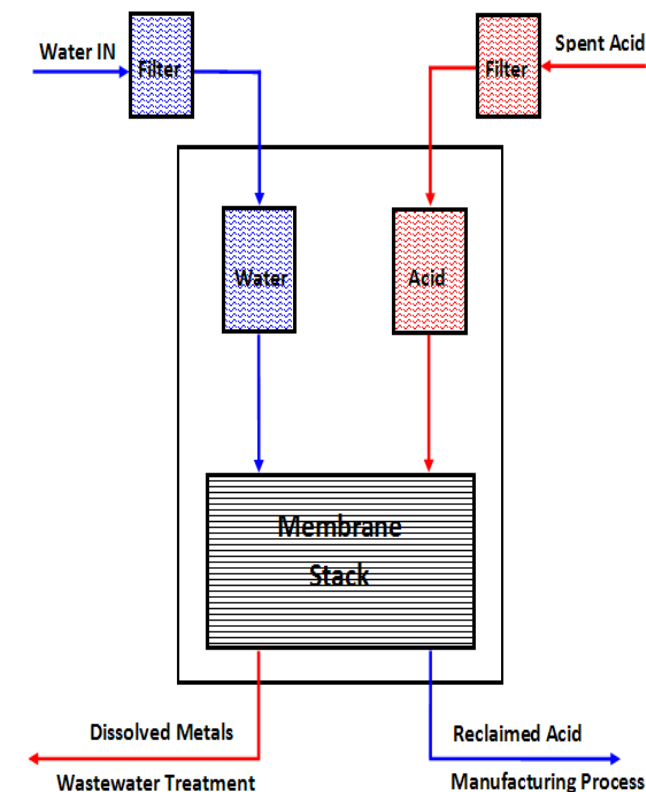


Picture of the filtration skid and six diffusion dialysis membrane modules. The system processes 1800 gallons per day of an acid leaching solution and recovers 90% of the hydrochloric acid for recycling to the ore leaching operation

Diffusion Dialysis Technology

In the recovery of acids with diffusion dialysis, an anion exchange membrane acts as a semi-permeable barrier between a flowing water stream and a flowing acid solution that contains the dissolved metals. The anion exchange membrane has fixed positive charges located on its surface. These positive charge locations attract the negatively charged anions in the solution that come in close contact with the anion exchange membrane surface. As a result, the acids in the spent or waste acid solution are attracted to the membrane.

The metal ions which are larger molecules and positively charged are repelled by the positively charged membrane. This allows the acid molecules to diffuse through the membrane at a much faster rate than the dissolved metals. The result is that the water entering a diffusion dialysis system exits as the recovered acid solution containing most of the acid. The spent or waste acid solution entering the diffusion dialysis exits as an acid depleted solution containing most of the dissolved metals. Normal acid recovery is 80% to 90% with removal of 70% to 90% of the dissolved metals.



Picture shows a complete AP-300 system with filter skid and control module integrated with the clients feed acid and process tanks.

The system is being utilized to recover nitric acid used in the chemical machining of precision aircraft components.

The system processes 300 gallons per day of the contaminated nitric acid solution removing the metal fines and dissolved metals from the acid solution. The diffusion dialysis membrane unit is recovering 85% to 90% of the HNO_3 acid.

With new emphasis on cost reduction and green technologies in the manufacturing sector, these membrane systems are finding new applications for recovering and purifying spent or waste acid streams.

Acid Recovery Applications

Hydrochloric	Nitric	Sulfuric	Hydrofluoric
Iron & Steel Pickling	Copper Rack Stripping	Aluminum Anodizing	Stainless Steel Pickling
Blades & Vanes	Nickel Rack Stripping	Copper Pickling	Stainless Steel Passivation
Nickel Pickling	Steel Etching	Iron & Steel Pickling	Chemical Milling
Chrome Rack Stripping	Stainless Steel Passivation	Sulfuric Dips	Acid Etching
Aluminum	Chemical Machining	Battery Electrolytes	Metal Finishing
Ore Leachate	Electrodrilling	Ore Leachate	



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