

Acid Purification

*for Hydrometallurgy Processes
Recover Acid and Control
Metal Impurities*



APU[®]

The Eco-Tec APU[®] offers a way to simply and economically purify acid bleed streams, allowing their recycle and reuse. The separated metals can then be cost effectively reclaimed following APU[®] treatment.

Applications in Hydrometallurgy

The APU[®] can be used to continually remove metal impurities from copper and zinc electrolyte bleed streams. The purified acid can then be recycled back to the tank house. This significantly reduces acid consumption and waste treatment expenses.

- **Sulfuric acid recovery from copper refinery electrolyte bleed streams**
- **Impurity for copper electrolyte bleed streams including;**
 - separation of nickel impurity
 - separation of iron impurity
 - separation of arsenic impurity
 - separation of antimony/bismuth impurity
- **Purification of zinc refinery electrolyte bleed streams including;**
 - separation of magnesium and manganese from sulfuric acid
- **Impurity removal from cobalt advance electrolytes**
 - nickel removal
 - zinc removal
 - copper removal
- **Copper recovery from heap/dump leach streams**
- **Nickel recovery from leach streams**



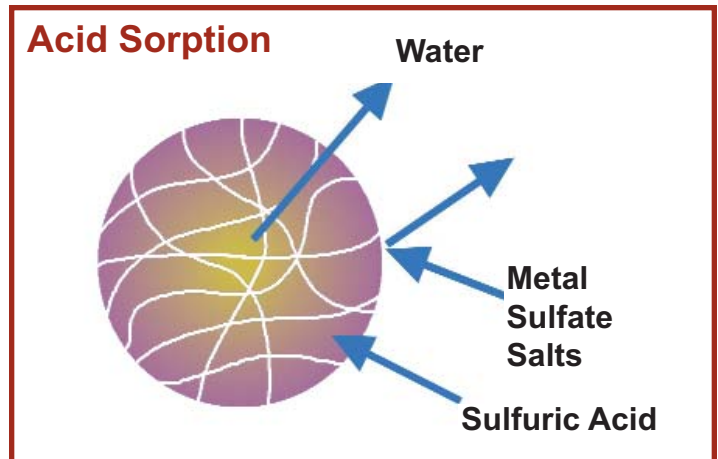
Typical APU[®] Performance

Stream	H ₂ SO ₄ (g/l)	Ni (g/l)	Cu (g/l)	Relative Flow
Feed	275	15.00	5.00	1
Acid Product	240	3.75	1.25	1
Metal By-product	35	11.25	3.75	1
Water	-	-	-	1
Loss/Removal	12.75%	75%	75%	-

How Does the APU® Work?

Strong mineral acids like sulfuric acid can be separated from dissolved metal salts using the APU®. The process driving force is based on concentration differences and does not require high energy input.

The APU® utilizes a unique sorbent resin which has the ability to remove acids such as sulfuric, hydrochloric, nitric, phosphoric, and hydrofluoric from aqueous solutions. Metallic salt impurities such as iron, aluminum, copper, zinc, etc. are not removed.

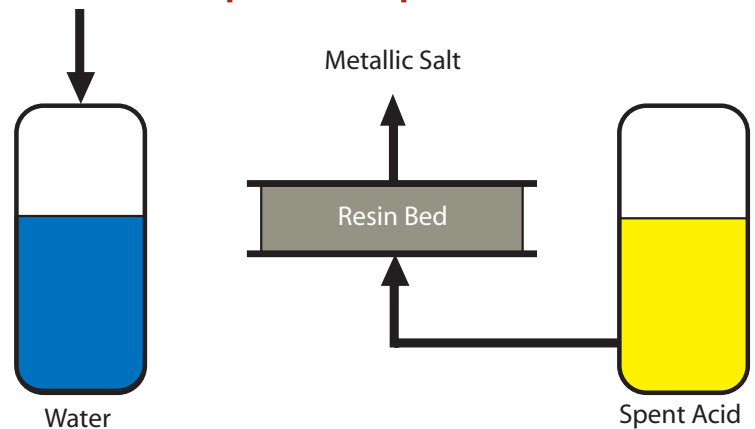


Simple Process

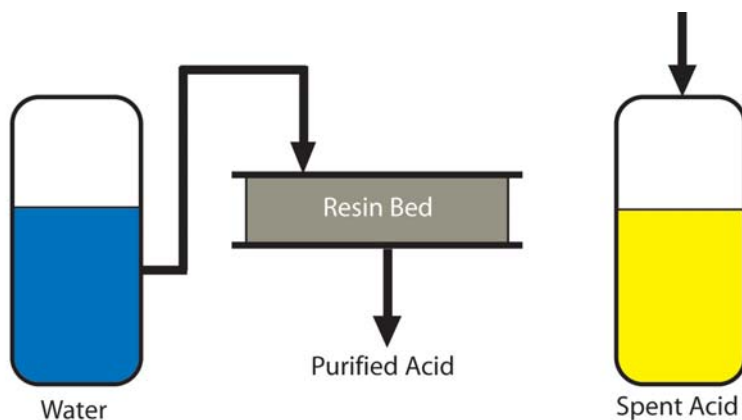
There are two steps in the APU® process - the "upstroke" and the "down-stroke".

- **Upstroke:** spent acid is pumped into the bottom of the resin bed. Acid is sorbed by the resin particles and the remaining de-acidified metallic salt solution, designated as the "by-product" is collected from the top of the bed.

Upstroke Operation



Downstroke Operation



- **Downstroke:** water is pumped into the top of the bed, desorbing the purified acid from the resin so that a purified acid "product" is collected from the bottom of the bed. The total cycle typically takes about 5 minutes to complete.

maximum recovery ~ simple package ~ proven reliability

Features	Benefits	Advantages
Short bed height Small resin volume Counter-current operation Pre-assembled, skid mounted Fully automated Full factory pre-testing	Low resin inventory (80 - 90% reduction) Fast commissioning Low installed cost High separation efficiency In-house development, manufacturing, quality control Technical depth - laboratory, research, service	Lower free acid losses Extensive operating experience Long, proven resin life Easy servicing by plant personnel Lower replacement costs

Hydrometallurgy Partial User's List

Customer	Location	Application
Xstrata Copper, Kidd Creek	Ontario, CANADA	Copper Electrolyte Purification
Sterlite Copper <i>Multiple Systems</i>	INDIA	Copper Electrolyte Purification
Westaim	Alberta, CANADA	Cobalt Advance Electrolyte Purification
Metallo-Chimique	BELGIUM	Copper Electrolyte Purification
Freeport-McMoRan	Arizona, USA	De-acidification of Copper Electrolyte
Canada Electrolyte Zinc	Quebec, CANADA	Zinc Electrolyte Purification
Freeport-McMoRan	Texas, USA	Copper Electrolyte Purification
KAZZINC JSC - UST Kamenogorsk	Republic of KAZAKHSTAN	Copper Electrolyte Purification

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