

Metal Processing Application

Acid Recovery Systems

Membrane systems are ideal for the recovery of acid from a variety of industrial applications including radioactive solutions. Typical recovery and rejection rates are presented below:

Sulphuric Acid

Results generated on a 35% sulphuric acid feed stream. Metals recovered for re-use.

Component	Feed (mg/l)	% Rejection
Copper	2,880	82.0
Iron	1,640	99.6
Lead	20	90.0
Zinc	780	98.9
Cadmium	5,060	92.0
Arsenic	1,750	22.0
Fluoride	2,416	59.0
Chloride	569	33.3

Nitric Acid

Acid recovery from a 2 normal acid solution contaminated with uranyl nitrate at 10,000 mg/l. 85% recovery achieved with less than 200 mg/l uranyl nitrate in the effluent.

Component	Feed (mg/l)	% Rejection
First Pass		
HNO ₃	2N	0
UO ₃ NO ₃	14,417	85.0
Second Pass		
HNO ₃	2N	0
UO ₃ NO ₃	1,457	86.0

Boric Acid

Results generated from a feed stream containing radio-nuclides. High degree of radionuclide rejection was achieved.

Component	% Rejection
Boric Acid	3.0
CO ₅₈	84.5
CO ₆₀	87.9
Sb ₁₂₄	99.0
Mn	86.0

Phosphoric Acid

Results generated on a 25% phosphoric acid stream.

Component	Feed (mg/l)	% Rejection
Sulphate	15,300	99.4
Aluminium	3,300	99.9
Iron	2,800	99.9
Magnesium	2,800	98.8
Vanadium	600	99.9
Cadmium	68	93.5
Organic Carbon	245	60.0

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Benefit Summary

Competitive Edge of Membrane Plants versus Conventional Precipitation Plants	
Membrane Advantage	Justification
Low Capital Cost	Smaller Ion Exchange Plant Low civil engineering investment requirement Low earth working investment requirement
Rapid Investment Pay back	Reduced raw material usage Reduced effluent disposal costs Reduced towns water / natural water intake requirement Reduced loading on Ion Exchange Plant
Reduce, Recycle & Re-use	Reduced sludge generation Recycle of residual metals Recycle of spent acid Re-use of high quality treated effluent
Confidence of Environmental Compliance	Robust treatment process that is not affected by temperature, complexing ions, or variations in pH Fixed physical barrier thereby guaranteeing compliance State of the Art Technology (BATNEEC)
Modular System	Discrete process units facilitating incremental upgrading

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