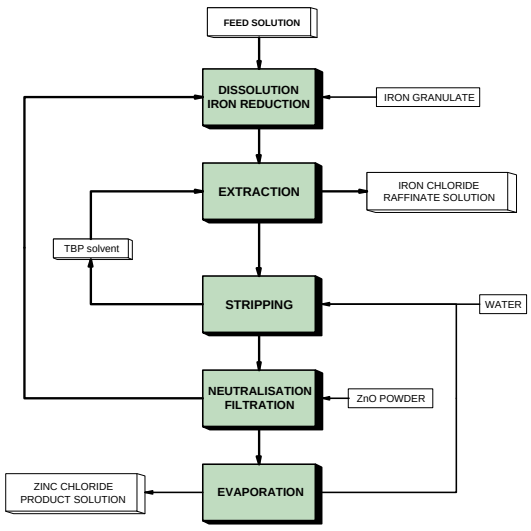
MEAB

Hydrometallurgical Process Applications

The MeS Process

Recovery of Zinc from Spent Hydrochloric Acid Pickling Liquors

Zinc Extraction Pilot Plant in Holland



Block diagram:
Extraction of Zinc from Weak Acid Effluents

Spent hydrochloric acid pickling liquors, emanating from the galvanizing industry, contain 100 - 130 g/l iron (mainly $FeCl_2$) and 20 - 70 g/l zinc. The iron and zinc concentrations balance, e.g. high zinc concentration will be accompanied by low iron concentration. From these spent pickling liquors, zinc is separated from iron and recovered. Using solvent extraction, zinc is first extracted as a zinc chloride complex to an organic solution containing tri-butyl phosphate (TBP).

To avoid co-extraction of iron, the iron is initially reduced to its II-valent state. Then, zinc is extracted as a zinc chloride complex into an organic solution containing TBP. During extraction, iron is maintained as Fe^{2+} by an iron metal reactor, included in the mixer-settler aqueous recycle loop.

Zinc is stripped from the organic solution with water or dilute hydrochloric acid. The resulting strip solution is evaporated, either (1) after addition of sulfuric acid, giving a dilute hydrochloric acid condensate and a zinc sulfate precipitate or (2) directly without any addition, giving a dilute hydrochloric acid condensate and a concentrate zinc chloride product solution.

Three product streams are possible from

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the process:

- Iron (II) chloride solution for possible treatment in a pyrolysis plant or, more probably, for the production of flocculation chemicals used in sewage water treatment;
- Dilute hydrochloric acid condensate mainly used as strip solution;
- Zinc sulfate (solid precipitate) or a concentrated (about 250 g/dm^3) zinc chloride solution.

A pilot plant, containing two pulsed columns, one for extraction and one for stripping, and batch-wise evaporation was in operation in Sweden during 1981. Pilot plant operations have also been performed in Holland and Germany. The experience from these tests shows that the process concept is technically practicable and well proven. The economics of the process, however, are strongly dependent on the cost for disposal of spent pickling liquors.

Reference.

Recovery of Zinc from Spent Hydrochloric Acid Pickling Liquors

Recovery of Metals from Liquid Effluents, Handbook of Solvent Extraction 1982.