

Solvent Extraction is a Unit Operation in Hydrometallurgy for the Recovery of Metals from Solutions.

## Introduction

Solvent extraction, as applied to Hydrometallurgy, is a unit operation for the purification and concentration of a wide variety of metals. It consists of contacting an organic phase containing an extractant, with an aqueous phase containing the metal of interest. The extractant chemically reacts with the metal to form an organic-metal complex that is soluble in the organic phase. Impurities normally do not react with the extractant and remain in the aqueous phase. The organic phase, containing the organic-metal complex, is separated from the aqueous phase. The metal is recovered and concentrated into another aqueous phase by reversing the chemical reaction.

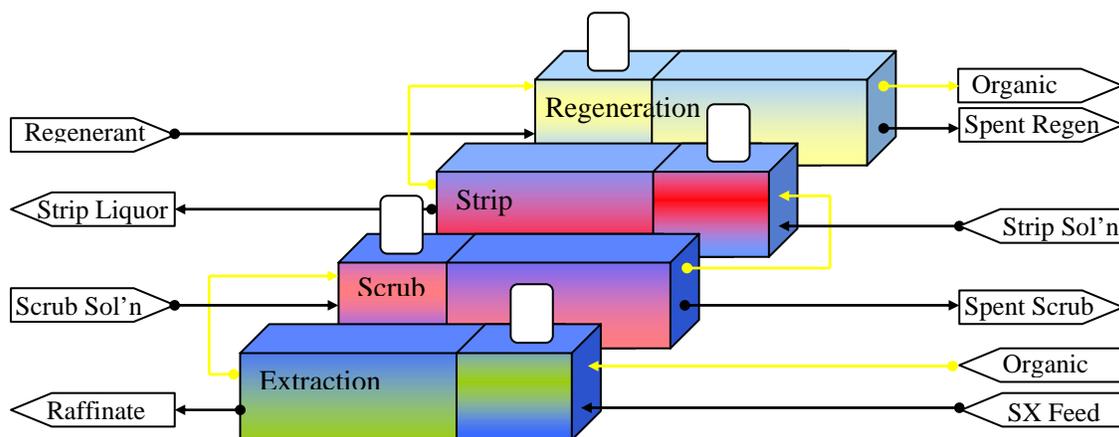
Solvent extraction was first applied to higher value metals, but now due to availability of new extractants with improved selectivity, faster kinetics and phase disengagement times, and recent developments in efficient equipment with less area and reagent inventory, the technology is now applicable to lower value metals.

**Extraction:** The operation of transferring the metal of interest from the aqueous phase (SX Feed) to the organic phase. The extraction circuit produces a loaded organic containing the metal value and an aqueous phase depleted of the metal known as raffinate. The raffinate is sent for further treatment or effluent.

**Scrubbing:** The selective removal of impurity metals from the loaded organic phase by treatment with either fresh scrub solution or a bleed of the strip liquor. The spent scrub solution is normally combined with the SX Feed. The scrubbed organic containing the metal of interest is advanced to stripping.

**Stripping:** The process of removing the metal of value from the scrubbed organic phase by reversing the extraction chemical reaction. It is normally conducted under conditions in order to produce a strip liquor containing a high concentration of the metal value. The strip liquor is the product of the SX circuit.

**Regeneration:** The treatment of the stripped organic phase for removal of metals that were not scrubbed or stripped, or for the removal of organic degradation products. The operation produces a regenerated organic phase for recycle to the extraction operation as organic feed. The spent regenerant is advanced for further processing or to effluent treatment.



**Illustration of a Solvent Extraction Process with Recommended Nomenclature**