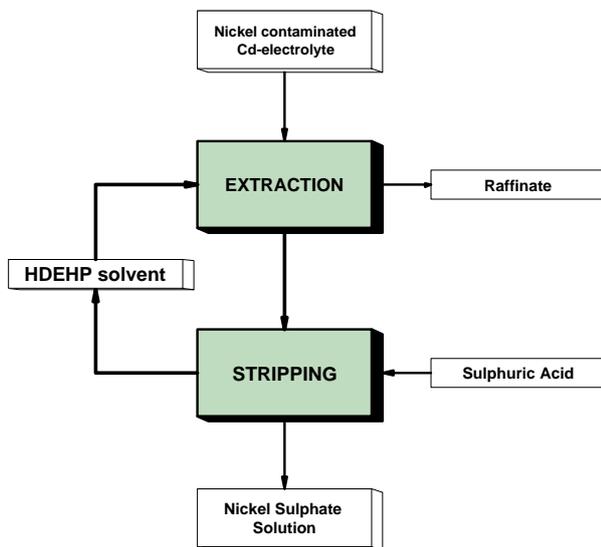


## Electrolyte Purification Process

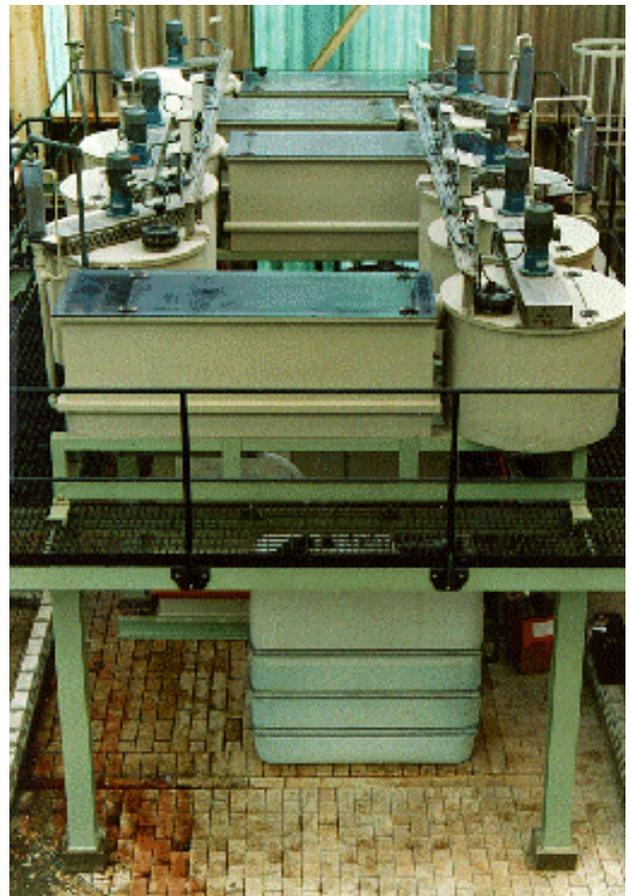
### Extraction of nickel from a cadmium electrolyte

In the electrowinning of cadmium, nickel is an interfering element that has to be continuously removed from the electrolyte, a weak acidic cadmium sulfate solution. To handle the undesirable build-up of nickel contamination and at the same time, obey environmental demands, a solvent extraction “kidney” was installed.



The nickel extraction can be performed with DEHPA under defined conditions. The extraction of nickel is pH dependant and the D-value for nickel decreases drastically with decreasing pH below 3.5. The extraction of each nickel ion ( $\text{Ni}^{2+}$ ) liberates two hydrogen ions ( $\text{H}^+$ ) from the extractant  $\text{H}^+\text{DEHPA}$ , which means that only a very small amount of nickel can be transferred to the solvent before the extraction stops. However, by adding a neutralization

reagent ( $\text{NaOH}$ ) into the mixer simultaneously with nickel extraction, this disadvantage can be avoided. Three large mixers in parallel are used to allow for the necessary reaction time.



**Nickel extraction plant with simultaneous neutralization**

# MEAB

In the block diagram above, there are two extraction stages, containing three parallel mixers followed by a settler, and two stripping stages with normal mixer-settler arrangement. The pH is measured and the acidity controlled by the addition of NaOH in the two first mixers. The extraction efficiency for nickel is better than 98 %.

Another alternative is to use the sodium form of the reagent ( $\text{Na}^+\text{R}$ ) to eliminate the extraction dependency on  $\text{H}^+$  (pH) when extracting nickel with an acid reagent. From a weak sulphuric acid rinse water containing 1 - 2  $\text{g/dm}^3$  Ni, the metal could be

effectively (> 99 %) removed in two extraction stages.

By loading the solvent with nickel, the transfer of sodium to the strip solution was minimized. Nickel was stripped from the loaded solvent with dilute sulphuric acid and nickel recovery from the strip solution was best performed by electrowinning. The main problem with this procedure was high loss of extractant in the NaOH extraction reconditioning wash. A considerable reduction of this loss could be achieved by an increased amount of sodium sulphate in the wash solution.