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COPPER SX-EW BASIC PRINCIPLES AND DETAILED PLANT DESIGN SHORT COURSE OUTLINE

REFERENCE SOURCES

BASIC PROCESS
- Key SX functions
- Simplified flowsheet
- Simplistic chemistry & Implications
- Applications
-

HISTORY

REASONS FOR GROWTH

ALTERNATIVE PROCESSES
- Precipitation of cement copper with scrap iron
- Direct electrowinning
- Copper powder production
- Copper oxide production
- Cuprous chloride precipitation
- Precipitation of copper sulphide with H_2S or sodium sulphide
- Replacement of SX by ion exchange (IX)
- Replacement of EW by copper sulphate production

- ORGANIC LIQUIDS IN SX
- Extractants
- Modifiers
- Diluents
- Organic stability
- Organic selectivity
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TYPICAL FLOWSHEETS
- SX
- EW
- Ancillary facilities:
- - Crud treatment
- - Solutions holding tank
- - Reagent facilities
- Variations in SX circuits:
- - Series-parallel
- - Split circuit

SX CONTACTORS
- Mixer-Settlers:
  - Types used for commercial copper SX
  - Types used for commercial non-copper SX
  - Types piloted for copper SX
- Column contactors
- Centrifugal contactors

SX ANCILLARY FACILITIES
- SX Crud
- Clay treatment of organic
- Electrolyte clean-up
- Loaded organic clean-up
- Raffinate clean-up

EW CELLS
- Principle of Operation
- Alternative Designs
- Anodes and Cathodes
-

EW MATERIALS HANDLING
- Harvesting
- Washing and stripping
- Sampling, weighing, and banding
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EW ANCILLARY FACILITIES
- Rectiformers
- Acid mist control
- Iron control
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PLANT ARRANGEMENT & LAYOUT
- Key Considerations
- Various SX Arrangements
- Various EW Arrangements
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SX FIRE PROTECTION
- Industry Experience
- Causes
- Fire Prevention Measures
- Fire Protection Systems
- Fire Containment and Risk Reduction System
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MATERIALS OF CONSTRUCTION
- SX area
- EW area

TESTWORK
- Overall test program strategy
- Leach solution samples
- SX test procedures
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SCALE-UP & DESIGN CRITERIA
- Recommended Guidelines for Scale-Up
- Typical design criteria

PLANT OPERATION
- Operating characteristics
- Personnel
- Instrumentation/Controls
- Sampling/Analytical

PERFORMANCE AND RISK

INDUSTRY TRENDS

EXAMPLE PLANT DESIGN
- Plant Design Criteria
- Basic Process Design Calculations
- Mixer-Settler Design
- EW Cell Design
- Tank and Pond Design
- Other Equipment Design
- Plant Arrangement
- Engineering Notes
- Equipment List
- Design Sketches