Basis of Sustainable Environmental Systems HSLU, Semester 3

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i'll do it later don't worry

Part II

Separation techniques

1 A bit of chem again

1.1 Solutions key terms

• Solvent: the substance that dissolves another substance

• Solute: the substance that is dissolved in a solvent

• Solution: it's a homogeneous mixture of two or more substances

What it is needed?

• Identify the substances to be separated from the mixture

• To collect useful substances free from impurities

• To remove unwanted particles

1.2 Classification of techniques

Physical Techniques	Chemical Techniques	Biological Techniques	Advanced / Emerging Techniques
Sedimentation	Flocculation / Coagulation	Bioremediation	Membrane Filtration
Decantation	Precipitation	Activated Sludge Process	Distillation
Filtration	Adsorption	Constructed Wetlands	Electrodialysis
Centrifugation	Absorption		Supercritical Fluid Extraction
Dissolved Air Flotation	Ion Exchange		Chromatography
Crystallization	Electrocoagulation		Air Stripping
Evaporation			Membrane Gas Absorption
Sublimation			
Magnetic Separation			7
Screening / Sieving			

Separation techniques overview

2 Physical separation

- 2.1 Sedimentation
- 2.2 Decantation
- 2.3 Filtration
- 2.3.1 Sand filtration
- 2.3.2 Reverse osmosis
- 2.4 Centrifugation
- 2.5 Dissolved Air Flotation (DAF)
- 2.6 Magnetic separation
- 2.7 Screening and Sieving

3 Chemical separation

- 3.1 Flocculation
- 3.1.1 Flocculant
- 3.1.2 Coagulation
- 3.2 Electrocoagulation
- 3.3 Precipitation
- 3.4 Adsorbtion
- 3.4.1 Activated carbon
- 3.5 Absorption
- 3.5.1 Wet scrubber
- 3.6 Ion exchange
- 3.7 Crystallization
- 3.8 Evaporation
- 3.9 Sublimation

4 Advanced/Emerging separation

- 4.1 Mebrane filtration
- 4.1.1 Micro osmosis
- 4.1.2 Nano osmosis
- 4.1.3 Ultra osmosis
- 4.1.4 Reverse osmosis
- 4.2 Electrodialysis
- 4.3 Extraction
- 4.3.1 Liquid-Liquid Extraction (LLE)
- 4.3.2 Soxhlet extraction
- 4.3.3 Supercritical Fluid Extraction
- 4.4 Air stripping

Same as Wet Scrubber, but with water

4.5 Electrostatic precipitator (ESP)