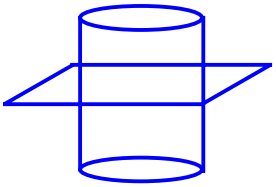
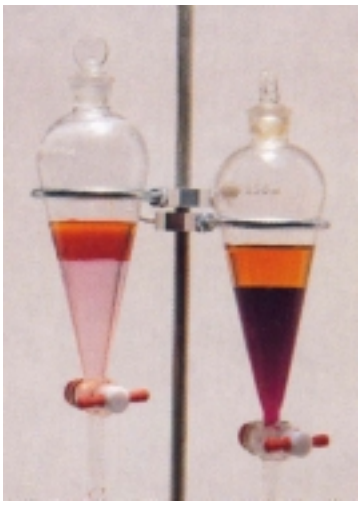
Lecture Notes V: Solubility I

1) Recrystallization as a means of purification



2) Extraction as a means of purification



A solute molecule, A, has a partition coefficient of 3 between toluene and water (with 3 times as much in the toluene phase).

Suppose that 100ml of a 0.01M aqueous solution of A is extracted with toluene. What fraction of A remains in the aqueous phase if an extraction is done with 500ml of toluene.

3) Solubility of ionic solids (salts)

All nitrates (NO_3^-) are soluble
All chlorates (ClO_3^-) are soluble
Most perchlorates (ClO_4^-) are soluble except $K(ClO_4)$
Almost all Group I (Li, Na, K, Rb, Cs) salts are soluble ($K(ClO_4)$ is an exception)
Most halides are soluble (except AgCl AgBr AgI, Hg_2Cl_2 Hg_2Br_2 Hg_2I_2 HgI_2, MgF_2, CaF_2, PbI_2)
Most sulfates (SO_4^-) are soluble (except $CaSO_4$, Ag_2SO_4, Hg_2SO_4 , $SrSO_4$, $BaSO_4$, $PbSO_4$)
Most Sulfides (S^{-2}) (except Group I and II) are insoluble
Most carbonates (CO_3^{-2}) (except Group I and NH_4^+ salt) are insoluble
Most sulfites (SO_3^{-2}) (except Group I and NH_4^+ salt) are insoluble
Most phosphates (PO_4^{-3}) (except Group I and NH_4^+ salt) are insoluble
Most hydroxides (OH^-) (except Group I and Ba^{+2} salt) are insoluble

4) Saturated Solution, and the solubility product

Consider a beaker containing 100ml of water, with solid AgCl on the bottom.

What is the concentration of $[Ag^+]$ and $[Cl^-]$ in the solution?

How many grams of AgCl are dissolved in the water?

What is the solubility of AgCl in grams/liter?

Concept

If NaCl is added to the above solution, the amount of AgCl solid at the bottom of the beaker

a) increases b) decreases c) stays the same

5) The common ion effect

What is the solubility of AgCl in 0.1M NaCl?