CH 222 Guide to Solubility

I. Like Polarities Dissolve (or "Like Dissolves Like")

- **Polar solutes dissolve in polar solvents**
  NaCl (ionic) dissolves in water (polar)
  $KMnO_4$ (ionic) dissolves in water (polar)
  CH_3CH_2OH (polar) dissolves in water (but see III, below)

- **Non-polar solutes dissolve in non-polar solvents**
  Oil (non-polar) dissolves in gasoline (non-polar)
  Benzene (non-polar) dissolves in toluene (non-polar)

II. Polar and Non-Polar Species Do Not Dissolve

- **Polar solutes are insoluble in non-polar solvents**
  NaCl (ionic) is insoluble in gasoline (non-polar)
  Na_2CrO_4 (ionic) is insoluble in benzene (non-polar)

- **Non-polar solutes are insoluble in polar solvents**
  Oil (non-polar) is insoluble in water (polar)
  Toluene (non-polar) is insoluble in water (polar)

III. Organic Compounds, Water and Solubility

For organic compounds capable of hydrogen bonding (i.e. with a nitrogen or oxygen atom)

1 - 3 carbon atoms	water soluble	*ex: ethanol*
4 - 5 carbon atoms	borderline water solubility	*ex: n-butanol*
6 or more carbon atoms	water insoluble	*ex: n-hexanol*

Note: We will be discussing solubility in more detail during CH 223