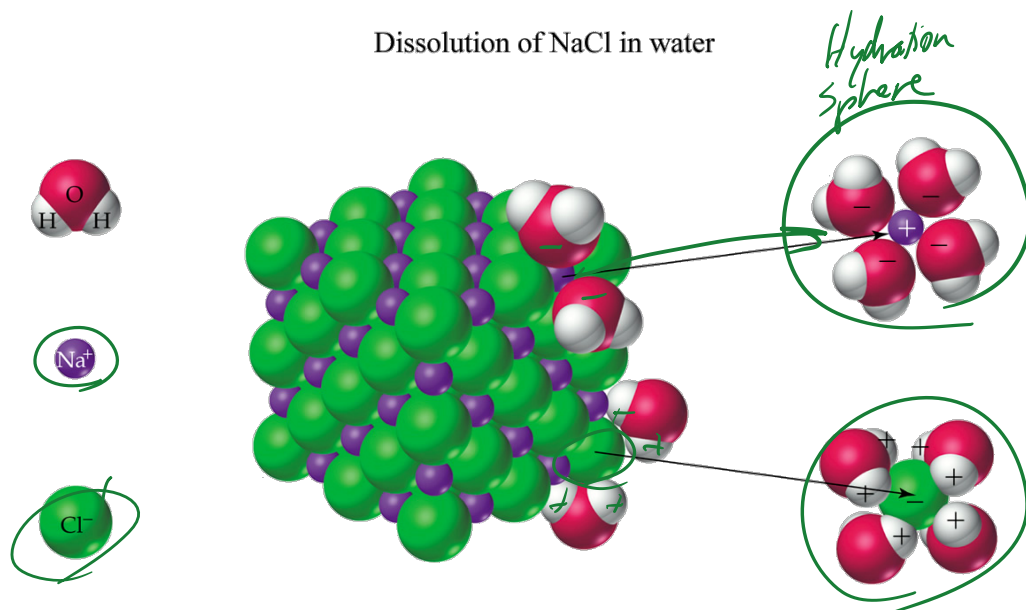


Ch. 4.1-4.2: Aqueous Solutions; Solubility Rules

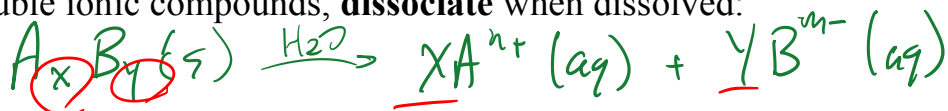
- General Properties of Aqueous Solutions
 - Recall: Homogeneous mixture of 2 or more pure substances
 - **Aqueous Solutions** of interest because water is polar, can dissolve many polar and ionic substances

• **Hydration** is process in which H_2O mols surround an ion and dissolve it into solution



• Electrolytes

- Soluble ionic compounds, **dissociate** when dissolved:



where $x(n^+) + y(m^-) = 0$ [Often $x=m$ and $y=n$, but not always]

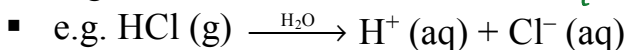


- Ions in solution provide mobile charge to conduct electricity (Demo!)

- Stronger Solution, higher solubility give higher conductivity

- Ionic compounds also conduct when molten - mobile charges

- Strong Acids & Bases dissociate/ionize completely, so are strong electrolytes



- Weak Acids & Bases partially ionize, so are weak electrolytes

- Molecular substances (e.g. sugar) do not ionize, no conductivity—**Nonelectrolytes**



Rules to determine electrolytes and non-electrolytes:

- All soluble ionics are strong electrolytes (including ionic bases)
- All molecular substances (covalents) are non-electrolytes except for acids and NH_3
- All strong acids are strong electrolytes
 HCl , HBr , HI , HNO_3 , H_2SO_4 , HClO_4 ****MEMORIZE!**
 Dissociate completely in water
- All other acids are weak electrolytes
 -Some common weak acids are the following:
 HF , HNO_2 , H_3PO_4 , CH_3COOH (acetic acid)
 Dissociate only slightly in water
- Ammonia (NH_3) is a weak electrolyte (weak base)
****MEMORIZE**

- Solubility Rules

- When two solutions are brought together, an **insoluble** combination of cation-anion may form (remember double replacement!):

- Insoluble compound precipitates from solution.

- Predict product based on solubility rules – See Reference Pack
 (Must know how to use, but no memorization!)

- Exceptions have common trends:

- Ca Ba Sr often exceptions (i.e. SO_4^{2-} , OH^-)

- Ag^+ , Pb^{2+} , Hg_2^{2+} always insoluble unless with always soluble anion

- Most anions always insoluble unless with always soluble cation

- Examples: Are the following compounds soluble or insoluble?



- For AP exam, need to know Na^+ , K^+ , NO_3^-

- In double-replacement reactions, there will always be one product containing at least one of these ions—the other will be insoluble

- **Homework #4-1:** Problems pg. 151 #4.1, 4.2, 4.3, 4.6, 4.8, 4.9 - 4.12, 4.20