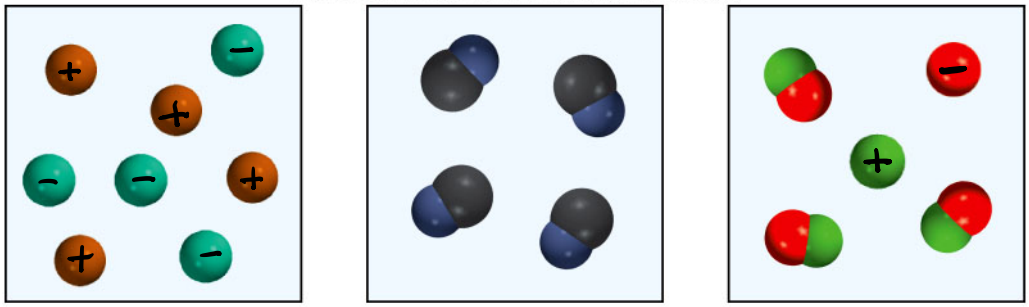
Chem 2 AP Homework #4-1: Aqueous Solutions and Solubility-KEY
(Problems pg. 151 #7, 8, 9, 10, 11, 12, 20 and one extra particle diagram)

4.7 **The aqueous solution of three compounds are shown in the diagram below. Identify each compound as a nonelectrolyte, a weak electrolyte or a strong electrolyte.** *(See book for diagram in color.)*

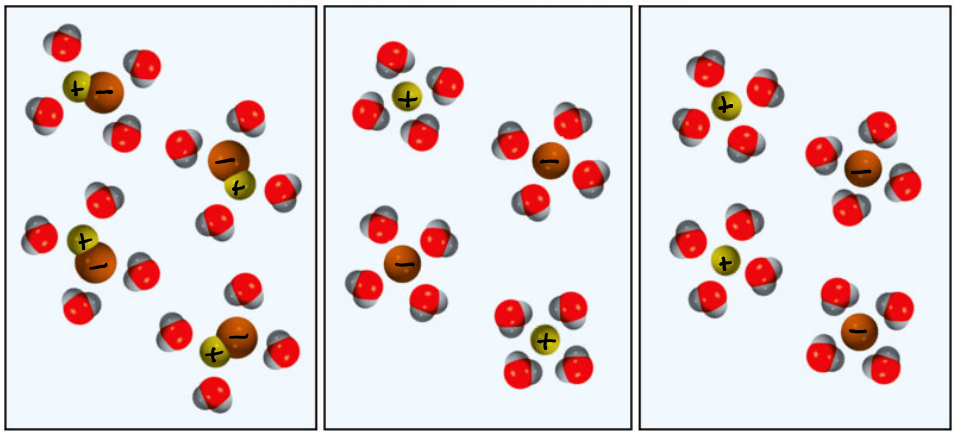


(a) Strong electrolyte

(b) Non-electrolyte

(c) Weak electrolyte

4.8 **Which of the following diagrams best represents the hydration of NaCl when dissolved in water (The Cl^- ion is larger in size than the Na^+ ion.)** ***See book for diagram in color.***



(a) (b) (c)

(c) When NaCl dissolves in water it dissociates into Na^+ and Cl^- ions. When the ions are hydrated, the water molecules will be oriented so that the negative end of the water dipole interacts with the positive sodium ion, and the positive end of the water dipole interacts with the negative chloride ion.

4.9 **Identify each of the following substances as a strong electrolyte; weak electrolyte or nonelectrolyte:**

(a) H_2O: non-electrolyte (molecular compound that is neither acid or base)
** *Disclaimer: In reality a tiny percentage of water molecules do ionize to H^+ and OH^-*

(b) KCl: strong electrolyte (soluble ionic)

(c) HNO_3: strong electrolyte (strong acid)

(d) CH_3COOH: weak electrolyte (weak acid)

(e) $C_{12}H_{22}O_{11}$: nonelectrolyte (molecular compound - neither acid nor base)

4.10 Identify each of the following substances as a strong electrolyte, weak electrolyte, or nonelectrolyte:

(a) $Ba(NO_3)_2$: strong electrolyte (soluble ionic)

(b) Ne: nonelectrolyte

(c) NH_3: weak electrolyte (weak base)

(d) NaOH: strong electrolyte (soluble ionic and strong base)

4.11 The passage of electricity through an electrolyte solution is caused by the movement of
a) electrons only b) cations only c) anions only d) both cations and anions

Since solutions must be electrically neutral, any flow of positive species (cations) must be balanced by the flow of negative species (anions). Therefore, the correct answer is **(d).**

4.12 Predict and explain which of the following systems are electrically conducting:

(a) Solid NaCl does not conduct. The ions are locked in a rigid lattice structure.

(b) Molten NaCl conducts. The ions can move around in the liquid state.

(c) Aqueous NaCl conducts. NaCl dissociates completely to $Na^+(aq)$ and $Cl^-(aq)$ in water.

4.20 Characterize the following compounds as soluble or insoluble in water:

(a) $CaCO_3$ is insoluble. Most carbonate compounds are insoluble.
(b) $ZnSO_4$ is soluble. Most sulfate compounds are soluble.

(c) $Hg(NO_3)_2$ is soluble. All nitrate compounds are soluble.

(d) $HgSO_4$ is insoluble. Most sulfate compounds are soluble, but those containing Ag^+, Ca^{2+}, Ba^{2+}, Hg^{2+}, and Pb^{2+} are insoluble.

(e) NH_4ClO_4 is soluble. All ammonium compounds are soluble.

Note: For the AP exam, you will only be expected to memorize that all ionic compounds containing alkali metal cations, the ammonium ion, and the nitrate ion are soluble.

A) A particle diagram of a $NaNO_3$ solution is shown below. Draw a particle diagram of a $CaBr_2$ solution in a similar fashion with correct proportion of ions. (Please show 3 cations in your diagram.)