

## Strong, Weak, or Non-Electrolyte?

For the purposes of this course, use these criteria to determine if a substance is a strong, weak, or non-electrolyte when dissolved in water (aqueous solution):

1. All ionic compounds are strong electrolytes, because they mostly break up into ions as they dissolve in water. Even insoluble ionic compounds (e.g.,  $\text{AgCl}$ ,  $\text{PbSO}_4$ ,  $\text{CaCO}_3$ ) are strong electrolytes, because the small amounts that do dissolve in water do so principally as ions; i.e., there is virtually no undissociated form of the compound in solution.
2. Molecular compounds may be non-electrolytes, weak electrolytes, or strong electrolytes, depending on whether they dissolve without ion formation, a little ion formation, or mostly ion formation, respectively. Examples:

| <u>Molecular Compound</u>                                       | <u>Electrolyte Type</u> | <u>Species in Solution</u> |
|---|-------------------------|----------------------------|
| sucrose (table sugar)   | non-electrolyte         | molecules only             |
| acetic acid ( $\text{HC}_2\text{H}_3\text{O}_2 = \text{HOAc}$ ) | weak electrolyte        | molecules and some ions    |
| hydrogen chloride ( $\text{HCl}$ )                              | strong electrolyte      | ions only                  |

3. Strong acids and strong bases are strong electrolytes [e.g.,  $\text{HCl}(aq)$ ,  $\text{H}_2\text{SO}_4(aq)$ ,  $\text{HClO}_4(aq)$ ;  $\text{NaOH}(aq)$ ]. There are virtually no molecules of a strong acid or base in solution, only ions.

Know the strong acids and bases on the accompanying hand-out "Strong and Weak Acids and Bases". Assume that any other acid or base you encounter in this course is weak, unless told to the contrary. [Note:  $\text{Mg}(\text{OH})_2$ , an insoluble compound, is a strong base because it is an ionic compound and therefore a strong electrolyte.]