CONCEPT: ELECTROLYTES (SIMPLIFIED)

- **Electrolytes** represent compounds that conduct _____ when entering their ionic forms when dissolved or melted.
  - Recall, *conductivity* is a physical property that deals with the ability of electric current to flow through a material.

Strong Electrolytes

- Represent solutes that _____ dissolve into ions when placed in a solvent (water).

$$NaCl\ (s) \longrightarrow$$

  - Strong Electrolytes are aqueous soluble ionic compounds **(Solubility Rules)**, *strong acids*, or *strong bases*.

Classification of Electrolytes

Type of Electrolyte	Degree of Dissolution	Species in Solution	Conductivity	Examples
Strong Electrolyte	_____	_____	_____	▫ $NaCl$, $NaNO_3$, KBr, $MgCl_2$ ▫ HBr, HCl, HI, HNO_3, $HClO_4$, H_2SO_4 ▫ $NaOH$, KOH, $LiOH$

EXAMPLE: Write a balanced equation for the dissociation of the following strong electrolyte in water: $Fe(NO_3)_3$

CONCEPT: ELECTROLYTES (SIMPLIFIED)

Weak Electrolytes

- Represent solutes that _____ dissolve into ions when placed in a solvent.

$$HF\ (aq) \rightleftharpoons$$

  - □ The presence of reversible arrows indicates that we have a weak electrolyte.
  - □ Weak electrolytes are either insoluble ionic compounds, *weak acids* or *weak bases*.

Classification of Electrolytes

Type of Electrolyte	Degree of Dissolution	Species in Solution	Conductivity	Examples
Strong Electrolyte	Dissociates Completely	Ions	Yes	□ NaCl, $NaNO_3$, KBr, $MgCl_2$ □ HBr, HCl, HI, HNO_3, $HClO_4$, H_2SO_4 □ NaOH, KOH, LiOH
Weak Electrolyte	_____	_____ _____	_____	□ $CaSO_4$, $BaSO_4$, CaS □ HF, CH_3CO_2H (acetic acid) □ $Mg(OH)_2$, NH_3

EXAMPLE: Benzoic acid, C_6H_5COOH, is a weak acid. Would you expect benzoic acid solution to contain:

a) only $C_6H_5COO^-$ and H^+

b) only C_6H_5COOH

c) mostly C_6H_5COOH

d) mostly $C_6H_5COO^-$ and H^+

CONCEPT: ELECTROLYTES (SIMPLIFIED)

Non-Electrolytes

- Consist of *molecular/covalent compounds* that _____ dissolve into ions.

$$\underset{\text{(glucose)}}{C_6H_{12}O_6\ (s)} \longrightarrow$$

- Examples include water, sugars, alcohols and other non-ionic compounds.

Non-Electrolytes

Sugars

- Covalent compounds with the formula of $C_n(H_2O)_n$.

_____ Glucose _____ Sucrose

Alcohols

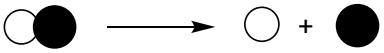
- Covalent compounds with C + H connected to OH.

_____ Methanol _____ Phenol

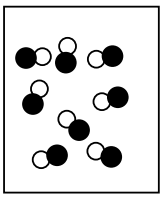
Classification of Electrolytes

Type of Electrolyte	Degree of Dissolution	Species in Solution	Conductivity	Examples
Strong Electrolyte	Dissociates Completely	Ions	Yes	▫ $NaCl$, $NaNO_3$, KBr, $MgCl_2$ ▫ HBr, HCl, HI, HNO_3, $HClO_4$, H_2SO_4 ▫ $NaOH$, KOH, $LiOH$
Weak Electrolyte	Dissociates Partially	Mostly molecules some ions	Weakly	▫ $CaSO_4$, $BaSO_4$, CaS ▫ HF, CH_3CO_2H (acetic acid) ▫ $Mg(OH)_2$, NH_3
Non-Electrolyte	_____	_____	_____	▫ $C_{12}H_{22}O_{11}$ (sucrose), CH_3OH ▫ H_2O, H_2O_2, CH_4N_2O

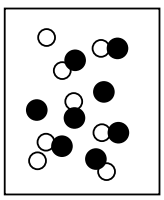
EXAMPLE: The dissolution of a compound is given by the reaction below:



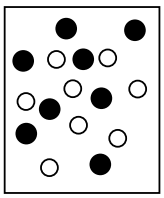
Identify each of the following solutions as either electrolytic, weakly electrolytic or non-electrolytic.



_____



_____



_____

CONCEPT: ELECTROLYTES (SIMPLIFIED)

PRACTICE: Each of the following reactions depicts a solute dissolving in water. Classify each solute as a strong electrolyte, a weak electrolyte or a non-electrolyte.

a) $PbSO_4\ (s) \longrightarrow PbSO_4\ (aq)$

b) $HC_2H_3O_2\ (aq) \rightleftharpoons H^+\ (aq) + C_2H_3O_2^-\ (aq)$

c) $CaS\ (s) \longrightarrow Ca^{2+}\ (aq) + S^{2-}\ (aq)$

d) $Hg\ (l) \longrightarrow Hg\ (aq)$

PRACTICE: Which of the following represents a non-electrolyte?

a) $(CH_3)_2NH_2$ b) $NaOH$ c) HIO_3 d) C_2H_5OH e) $CsNH_2$