

Chemistry 20 – Lesson 25
Theories of Acids and Bases

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1. Compare and contrast a *weak* acid and a *dilute* acid.

/2 **A *weak* acid refers to an acid that does not ionize 100% when it reacts with water, while a *dilute* acid refers to a solution with a relatively small amount of dissolved solute. The terms weak and dilute refer to different chemical properties.**

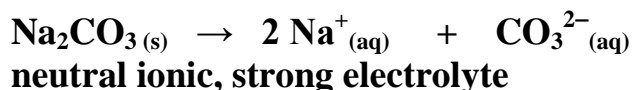
2. Compare and contrast a *strong* acid and a *concentrated* acid.

/2 **A *strong* acid refers to an acid that ionizes 100% when it reacts with water, while a *concentrated* acid refers to a solution with a relatively large amount of dissolved solute. The terms strong and concentrated refer to different chemical properties.**

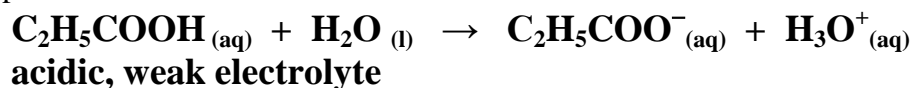
3.

/2 each

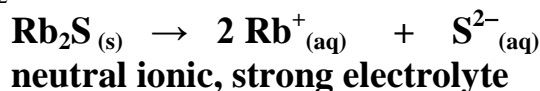
a. sodium carbonate



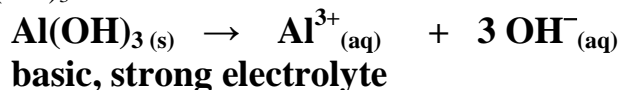
b. propanoic acid



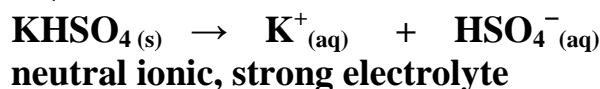
c. Rb_2S



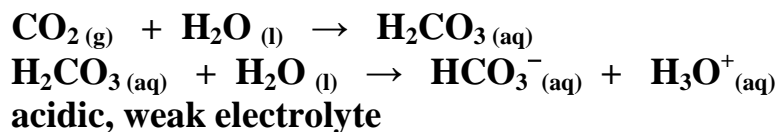
d. $\text{Al}(\text{OH})_3$



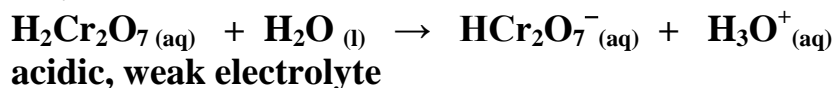
e. KHSO_4



f. CO_2



g. $\text{H}_2\text{Cr}_2\text{O}_7$



- h. NaNO_3
 $\text{NaNO}_3(\text{s}) \rightarrow \text{Na}^+(\text{aq}) + \text{NO}_3^-(\text{aq})$
neutral ionic, strong electrolyte
- i. $\text{C}_2\text{H}_5\text{OH}$
 $\text{C}_2\text{H}_5\text{OH}(\text{l}) \rightarrow \text{C}_2\text{H}_5\text{OH}(\text{aq})$
neutral molecular, non-electrolyte
- j. NH_3
 $\text{NH}_3(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{NH}_4^+(\text{aq}) + \text{OH}^-(\text{aq})$
basic, weak electrolyte
- k. H_2SO_3
 $\text{H}_2\text{SO}_3(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{HSO}_3^-(\text{aq}) + \text{H}_3\text{O}^+(\text{aq})$
acidic, weak electrolyte
- l. FrOH
 $\text{FrOH}(\text{s}) \rightarrow \text{Fr}^+(\text{aq}) + \text{OH}^-(\text{aq})$
basic, strong electrolyte
- m. HI
 $\text{HI}(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{I}^-(\text{aq}) + \text{H}_3\text{O}^+(\text{aq})$
acidic, strong electrolyte
- n. $\text{Fe}(\text{H}_2\text{PO}_4)_3$
 $\text{Fe}(\text{H}_2\text{PO}_4)_3(\text{s}) \rightarrow \text{Fe}^{3+}(\text{aq}) + 3\text{H}_2\text{PO}_4^-(\text{aq})$
neutral ionic, strong electrolyte
- o. HCOOH
 $\text{HCOOH}(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{HCOO}^-(\text{aq}) + \text{H}_3\text{O}^+(\text{aq})$
acidic, weak electrolyte
- p. H_3BO_3
 $\text{H}_3\text{BO}_3(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{BO}_3^-(\text{aq}) + \text{H}_3\text{O}^+(\text{aq})$
acidic, weak electrolyte
- q. $\text{C}_{12}\text{H}_{22}\text{O}_{11}$
 $\text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{s}) \rightarrow \text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{aq})$
neutral molecular, non-electrolyte

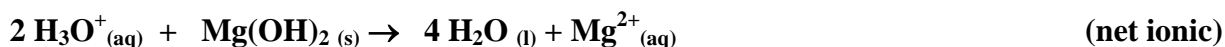
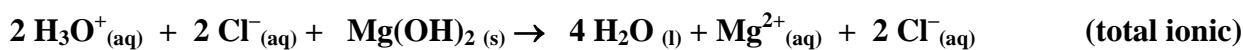
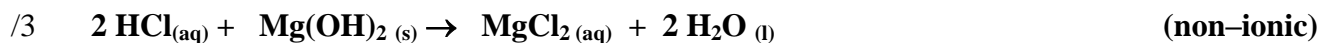
4.

1/ each

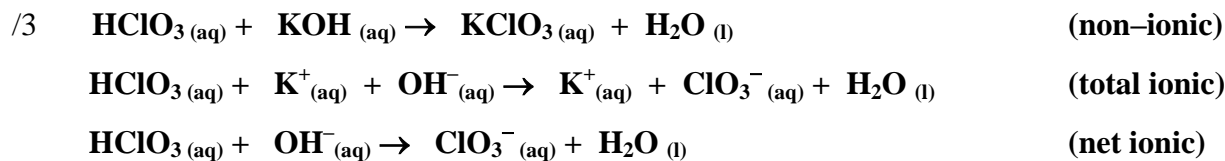
- a. A neutral solution has equal concentrations of H^+ (aq) and OH^- (aq). **(B)**
- b. An acid contains H_3O^+ (aq) in solution. **(MA)**
- c. A base dissociates to produce free OH^- (aq) in solution. **(A)**
- d. NH_3 (aq) produces a basic solution. **(MA)**
- e. The theory(ies) cannot predict whether H_2PO_4^- (aq) will act as an acid or as a base. **(B)**
- f. Neutralization occurs when H^+ (aq) + OH^- (aq) \rightarrow H_2O (l) **(A)**
- g. The theory(ies) involve(s) the creation of a hydronium ion. **(MA)**
- h. Basic solutions are formed when substances react with water to produce hydroxide ions. **(MA)**
- i. Water has no reactive role to play in the formation of acidic and basic solutions. **(A)**
- j. The theory(ies) can only predict the basic behaviour of substances containing the hydroxide ion. **(A)**
- k. This theory can explain the acid or base behaviours of more substances than the other theory. **(MA)**
- l. The theory(ies) need(s) revision to improve the ability to predict new results. **(A)**

5. For the following reactions, write the non-ionic, total ionic and net ionic reaction equations.

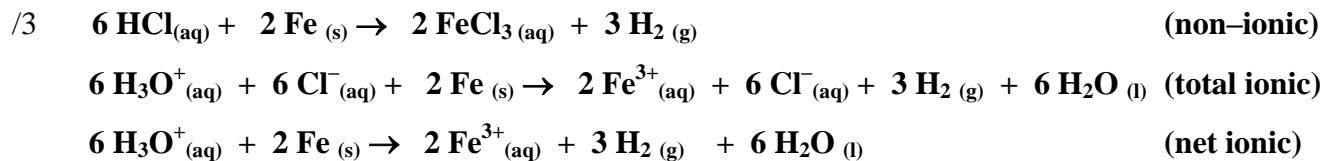
- a. Excess hydrochloric acid in gastric fluid may be neutralized by a magnesium hydroxide suspension.



b. Chloric acid is neutralized by a potassium hydroxide solution.



c. Iron pipes are strongly attacked and corroded by hydrochloric acid.



d. Hydrocyanic acid can be used to neutralize a barium hydroxide solution.

