

Discussion ch 4

Example 1

- When 2.61 g of solid Na_2CO_3 ($M = 105.9888 \text{ g/mol}$) is dissolved in sufficient water to make 250 mL of solution, the concentration of Na_2CO_3 is:

- $mole = \frac{mass}{Molar\ mass} = \frac{2.61}{105.9888} = 0.0246 \text{ mole}$

- $Molarity = \frac{moles}{V(L)} = \frac{0.0246}{0.25} = 0.0985M$

Example 2

- How many milliliters of 1.58 M HCl are needed to react completely with 23.2 g of NaHCO₃ (M= 84.02 g/mol)?



- Moles of NaHCO₃ = $\frac{\text{mass}}{\text{Molar mass}} = \frac{23.2}{84.02} = 0.276 \text{ mole}$

- Since 1 mole HCl \rightleftharpoons 1 mole NaHCO₃

- ? Mole HCl \leftarrow 0.276 mole NaHCO₃ \rightleftharpoons 0.276 mole HCl

- Volume = $\frac{\text{moles}}{M} = \frac{0.276}{1.5} = 0.1747 \text{ L} \rightleftharpoons = 175 \text{ mL HCl}$

Example 3

- How many moles of ions are released when 1.6 mol of ammonium phosphate, $(\text{NH}_4)_3\text{PO}_4$, is dissolved in water? 6.4 mole
- $(\text{NH}_4)_3\text{PO}_4 \rightleftharpoons 3 \text{NH}_4 + \text{PO}_4^{3-}$
- How many moles of $\text{H}^+(\text{aq})$ ions are present in 750 mL of 0.65 M hydrochloric acid? 0.49

- How many sodium ions are present in 325 mL of 0.850 M Na₂SO₄?
- 3.33×10^{23} Na ions
- Which of the following is most soluble in water?
 - benzene, C₆H₆
 - hexane, C₆H₁₄
 - potassium nitrate, KNO₃
 - ethane, C₂H₄
 - carbon tetrachloride, CCl₄
- Ans: B

- Which of the following solutions will be the poorest conductor of electrical current?

sucrose, $C_{12}H_{22}O_{11}(aq)$

lithium hydroxide, $LiOH(aq)$

sodium chloride, $NaCl(aq)$

sulfuric acid, $H_2SO_4(aq)$

potassium nitrate, $KNO_3(aq)$

Ans: A

- Which of these compounds is a *strong electrolyte*?

- A. H_2O
- B. N_2
- C. CH_3COOH (acetic acid)
- D. $\text{C}_2\text{H}_6\text{O}$ (ethanol)
- E. KOH

- Which of these compounds is a *weak electrolyte*?

- A. HCl
- B. CH_3COOH (acetic acid)
- C. $\text{C}_6\text{H}_{12}\text{O}_6$ (glucose)
- D. O_2
- E. NaCl

• Which one of the following substances is the best electrolyte?

A) CO B) CH₃Cl C) CH₄ D) C₂H₅OH E) HCl

• Ans: E

• In the following reaction, what ions, if any, are spectator ions?

• $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2\text{NaCl}(\text{aq}) \rightleftharpoons \text{PbCl}_2(\text{s}) + 2\text{NaNO}_3(\text{aq})$

A) $\text{Pb}^{2+}(\text{aq}), \text{Cl}^{-}(\text{aq})$

D) $\text{Na}^{+}(\text{aq}), \text{Cl}^{-}(\text{aq})$

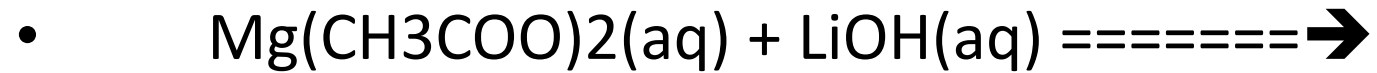
B) $\text{Na}^{+}(\text{aq}), \text{NO}_3^{-}(\text{aq})$

E) There are no spectator ions.

C) $\text{Pb}^{2+}(\text{aq}), \text{NO}_3^{-}(\text{aq})$

Ans: B

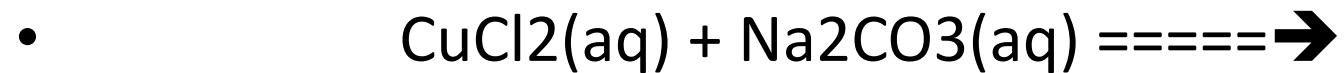
- Select the precipitate that forms when the following reactants are mixed.



- A) LiCH_3COO B) $\text{Li}(\text{CH}_3\text{COO})_2$ C) MgOH D) $\text{Mg}(\text{OH})_2$ E) CH_3OH

- Ans: D

- Select the correct name and chemical formula for the precipitate that forms when the following reactants are mixed.



- A) copper(I) carbonate, Cu_2CO_3 D) copper(II) carbonate, CuCO_3
- B) copper(II) carbonate, Cu_2CO_3 E) sodium chloride, NaCl
- C) copper(I) carbonate, CuCO_3

Ans: D

- Which of the following is a strong base?
- A) NH_3 B) $\text{Ca}(\text{OH})_2$ C) $\text{Al}(\text{OH})_3$ D) $\text{B}(\text{OH})_3$ E) CH_3OH
- Ans: B

- Select the net ionic equation for the reaction between lithium hydroxide and hydrobromic acid.
$$\text{LiOH}(aq) + \text{HBr}(aq) \rightarrow \text{H}_2\text{O}(l) + \text{LiBr}(aq)$$

A) $\text{LiOH}(aq) \rightarrow \text{Li}^+(aq) + \text{OH}^-(aq)$
B) $\text{HBr}(aq) \rightarrow \text{H}^+(aq) + \text{Br}^-(aq)$
C) $\text{H}^+(aq) + \text{OH}^-(aq) \rightarrow \text{H}_2\text{O}(l)$
D) $\text{Li}^+(aq) + \text{Br}^-(aq) \rightarrow \text{LiBr}(aq)$
E) $\text{Li}^+(aq) + \text{OH}^-(aq) + \text{H}^+(aq) + \text{Br}^-(aq) \rightarrow \text{H}_2\text{O}(l) + \text{LiBr}(aq)$
- Ans: C

- Vinegar is a solution of acetic acid, CH_3COOH , dissolved in water. A 5.54-g sample of vinegar was neutralized by 30.10 mL of 0.100 M NaOH. What is the percent by weight of acetic acid in the vinegar?
- A) 0.184% B) 1.63% C) 3.26% D) 5.43% E) 9.23%
- Ans: C

- The distinguishing characteristic of all electrolyte solutions is that they
 - A. contain molecules.
 - B. conduct electricity.
 - C. react with other solutions.
 - D. always contain acids.
 - E. conduct heat.

- What is the chemical formula of the salt produced by the neutralization of nitric acid with calcium hydroxide?
 - A. CaNO_3
 - B. $\text{Ca}_2(\text{NO}_3)_3$
 - C. $\text{Ca}_3(\text{NO}_3)_2$
 - D. Ca_2NO_3
 - E. $\text{Ca}(\text{NO}_3)_2$

• The oxidation number of Fe in $\text{K}_3\text{Fe}(\text{CN})_6$ is

A. +3.

B. +2.

C. +1.

D. -3.

E. -4.

• The oxidation number of Cr in $\text{Cr}_2\text{O}_7^{2-}$ is

A. -12.

B. -7.

C. -2.

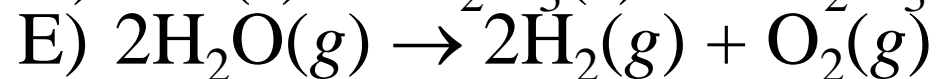
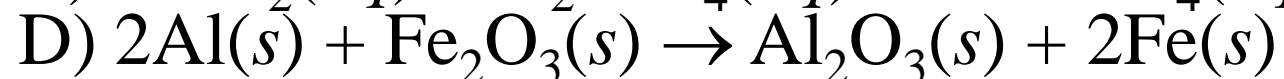
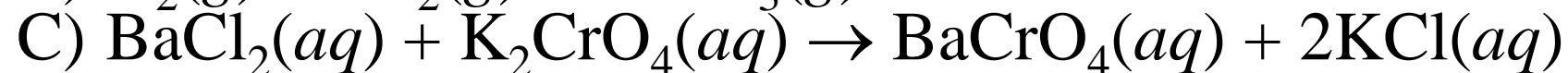
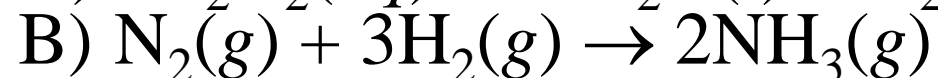
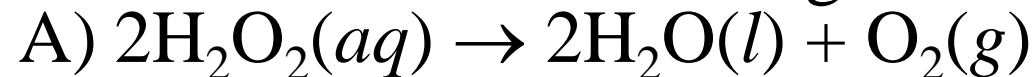
D. +6.

E. +7.

- In the chemical reaction $5\text{H}_2\text{O}_2 + 2\text{MnO}_4^- + 6\text{H}^+ \rightarrow 2\text{Mn}^{2+} + 8\text{H}_2\text{O} + 5\text{O}_2$, the *oxidizing agent* is

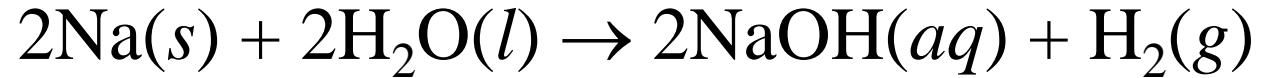
- A. H_2O_2 .
- B.** MnO_4^- .
- C. H^+ .
- D. Mn^{2+} .
- E. O_2 .

- Which one of the following is not a redox reaction?



Ans: C

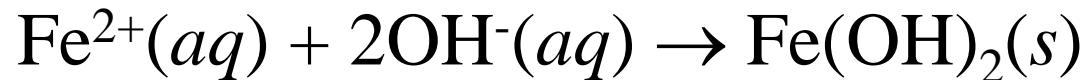
Select the classification for the following reaction.



- A) precipitation D) combination
B) acid-base E) None of these choices is correct.
C) redox

Ans: C

Select the classification for the following reaction.



- A) precipitation D) decomposition
B) acid-base E) None of these choices is correct.
C) redox

Ans: A

- Select the classification for the following reaction.



- A) precipitation D) decomposition
B) acid-base E) None of these choices is correct.
C) redox

Ans: B

- Select the classification for the following reaction.



- A) combination D) acid-base
B) decomposition E) None of these choices is correct.
C) displacement

Ans: A

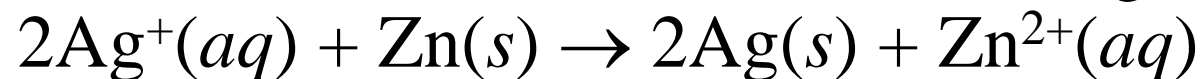
- Select the classification for the following reaction.



- A) acid-base D) displacement
B) precipitation E) decomposition
C) combination

Ans: E

- Select the classification for the following reaction.



- A) displacement D) precipitation
B) decomposition E) acid-base
C) combination

Ans: A