General Chemistry I (Chapter 3 - Chapter 5)

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1.

What is the correct name for **$Fe_2(SO_4)_3$**?

A. Iron sulfate
B. Iron(II) sulfate
C. Iron(III) sulfate
D. Iron(III) sulfite

2.

What is the correct formula for **dinitrogen tetroxide**?

A. N_2O_4
B. N_4O_2
C. NO_4
D. N_2O_3

3.

What is the molar mass of **$Ca(NO_3)_2$**?

A. 102.09 g/mol
B. 124.09 g/mol
C. 164.09 g/mol
D. 188.09 g/mol

4.

How many molecules are present in **18.0 g of H_2O**?

A. 3.01×10^{23} molecules
B. 6.02×10^{23} molecules
C. 1.08×10^{24} molecules
D. 18.0×10^{23} molecules

5.

A compound contains **40.0% C, 6.7% H, and 53.3% O** by mass. Which empirical formula is most likely?

A. $C_2H_4O_2$
B. CH_2O
C. C_2H_6O
D. CHO

6.

Which equation is correctly balanced?

A. $H_2 + O_2 \rightarrow H_2O$
B. $2H_2 + O_2 \rightarrow 2H_2O$
C. $H_2 + 2O_2 \rightarrow H_2O$
D. $2H_2 + 2O_2 \rightarrow 2H_2O$

7.

Consider:

$2H_2 + O_2 \rightarrow 2H_2O$

How many grams of H_2O can be produced from **3.00 mol H_2**, assuming excess O_2?

A. 18.0 g
B. 27.0 g
C. 54.0 g
D. 108 g

8.

Consider:

N_2 + 3H_2 → 2NH_3

If a reaction contains **2.0 mol N_2 and 4.0 mol H_2**, which reactant is limiting?

A. N_2
B. H_2
C. NH_3
D. Neither reactant

9.

A reaction has a theoretical yield of **40.0 g** and an actual yield of **32.0 g**. What is the percent yield?

A. 8.0%
B. 32.0%
C. 80.0%
D. 125%

10.

Which equation correctly represents the combustion of methane?

A. $CH_4 + O_2 \rightarrow CO_2 + H_2O$
B. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
C. $2CH_4 + O_2 \rightarrow 2CO_2 + H_2O$
D. $CH_4 + O_2 \rightarrow C + 2H_2O$

11.

Which equation correctly represents the reaction between **potassium and chlorine gas**?

A. $K + Cl \rightarrow KCl$
B. $2K + Cl_2 \rightarrow 2KCl$

C. $K_2 + Cl_2 \rightarrow 2KCl$
D. $K + Cl_2 \rightarrow KCl_2$

12.

What is the molarity of a solution containing **0.500 mol NaCl in 2.00 L** of solution?

A. 0.125 M
B. 0.250 M
C. 0.500 M
D. 1.00 M

13.

A **2.00 M** solution has a volume of **100.0 mL**. It is diluted to **500.0 mL**. What is the new concentration?

A. 0.100 M
B. 0.200 M
C. 0.400 M
D. 1.00 M

14.

Consider:

$AgNO_3$(aq) + NaCl(aq) → AgCl(s) + $NaNO_3$(aq)

If **0.300 mol $AgNO_3$** reacts with excess NaCl, how many moles of AgCl are produced?

A. 0.100 mol
B. 0.300 mol
C. 0.600 mol
D. 1.00 mol

15.

Which substance is a **nonelectrolyte** when dissolved in water?

A. NaCl
B. HCl
C. $C_6H_{12}O_6$
D. KOH

16.

Which substance is a **strong electrolyte** in aqueous solution?

A. $C_6H_{12}O_6$
B. C_2H_5OH
C. NaCl
D. CH_3OH

17.

Which substance is a **weak electrolyte** when dissolved in water?

A. HCl
B. NaOH
C. CH_3COOH
D. NaCl

18.

Which compound is **soluble** in water?

A. AgCl
B. $BaSO_4$
C. KNO_3
D. PbI_2

19.

Which equation correctly represents the reaction between **$BaCl_2$(aq)** and **Na_2SO_4(aq)**?

A. $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$
B. $BaCl_2 + Na_2SO_4 \rightarrow BaNa_2 + Cl_2SO_4$

C. $BaCl_2 + Na_2SO_4 \rightarrow BaCl + Na_2SO_4$
D. $BaCl_2 + Na_2SO_4 \rightarrow Ba_2SO_4 + NaCl_2$

20.

Which is the correct **complete ionic equation** for:

$AgNO_3$(aq) + NaCl(aq) → AgCl(s) + $NaNO_3$(aq)?

A. $Ag^+ + Cl^- \rightarrow AgCl(s)$

B. $Ag^+ + NO_3^- + Na^+ + Cl^- \rightarrow AgCl(s) + Na^+ + NO_3^-$

C. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

D. $Ag^+ + NO_3^- \rightarrow AgNO_3$

21.

Which set correctly represents the reaction between **HCl(aq)** and **NaOH(aq)**?

A.
Molecular: $HCl + NaOH \rightarrow NaCl + H_2O$
Complete ionic: $H^+ + Cl^- + Na^+ + OH^- \rightarrow Na^+ + Cl^- + H_2O$
Net ionic: $H^+ + OH^- \rightarrow H_2O$

B.
Molecular: $HCl + NaOH \rightarrow H_2 + NaClO$
Complete ionic: $H^+ + OH^- \rightarrow H_2$

C.
Molecular: $HCl + NaOH \rightarrow H_2O + NaOH$
Complete ionic: $H^+ + Cl^- \rightarrow HCl$

D.
Molecular: $HCl + NaOH \rightarrow NaCl + O_2$
Net ionic: $Na^+ + Cl^- \rightarrow NaCl$

22.

Which reaction produces a gas?

A. $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$

B. $HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) + H_2O(l)$

C. $Na_2CO_3(aq) + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2O(l) + CO_2(g)$

D. $KNO_3(aq) + NaCl(aq) \rightarrow$ no reaction

23.

What is the oxidation state of sulfur in $\mathbf{SO_4^{2-}}$?

A. −2
B. +2
C. +4
D. +6

24.

Consider:

$\mathbf{Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)}$

Which statement is correct?

A. Zn is reduced and Cu^{2+} is oxidized.
B. Zn is oxidized and Cu^{2+} is reduced.
C. Both Zn and Cu^{2+} are oxidized.
D. Neither substance undergoes oxidation or reduction.

25.

For the reaction:

$\mathbf{Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)}$

Which substance is the **reducing agent**?

A. Zn
B. Cu^{2+}
C. Zn^{2+}
D. Cu

26.

Which statement correctly describes a **spontaneous redox reaction**?

A. It can occur naturally under the given conditions without requiring continuous external energy.
B. It must always require a battery to occur.
C. It cannot involve electron transfer.
D. It must always produce a precipitate.