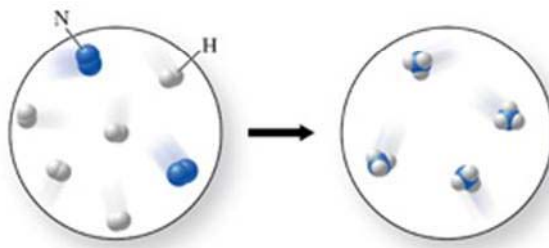


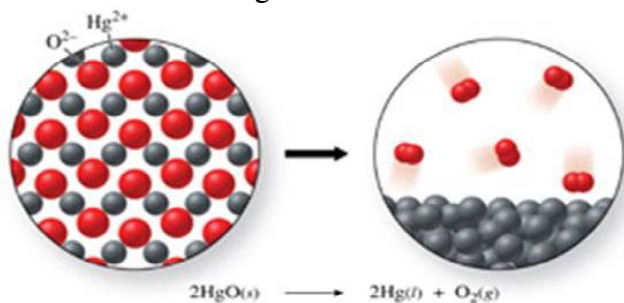
- Which of the following statements is **incorrect**?
 - SF_4 has $\frac{1}{4}$ as many sulfur atoms as fluorine atoms.
 - $\text{Ca}(\text{NO}_3)_2$ has six times as many oxygen atoms as calcium ions.
 - H_2SO_4 has twice as many oxygen atoms as hydrogen atoms.
 - SO_2 has twice as many oxygen atoms as sulfur atoms.
 - N_2H_4 has four times as many hydrogen atoms as nitrogen atoms.
- How many oxygen atoms are there in 0.25 mole of CO_2 ?
 - 4.2×10^{-25}
 - 0.25
 - 3.0×10^{23}
 - 0.50
 - 1.5×10^{23}
- Rank the following in order of increasing mass: 0.50 mole of water (H_2O), 0.20 mole of Fe, and 0.010 mole of U.
 - $\text{U} < \text{H}_2\text{O} < \text{Fe}$
 - $\text{U} < \text{Fe} < \text{H}_2\text{O}$
 - $\text{H}_2\text{O} < \text{U} < \text{Fe}$
 - $\text{U} < \text{H}_2\text{O} < \text{Fe}$
 - $\text{H}_2\text{O} < \text{Fe} < \text{U}$
- A 5.05 g sample of quartz (SiO_2) contains 2.36 g of silicon. What are the percents of silicon and oxygen in quartz?
 - 46.7% Si, and insufficient information to calculate % O
 - 53.3% Si and 46.7% O
 - 46.7% Si and 53.3% O
 - 29.9% Si and 70.1% O
 - 70.1% Si and 29.9% O
- Calculate the number of moles of NaOH (sodium hydroxide, an ingredient in drain cleaners and oven cleaners) in a 10.0 g sample of this substance.
 - 0.250 mole
 - 1.66×10^{23} mole
 - 0.208 mole
 - 4.00×10^2 moles
 - 1.51×10^{23} moles

6. Given the following molecular formulas, determine the empirical formula of each compound: N_2O_5 , H_2O_2 , $\text{C}_6\text{H}_4\text{Cl}_2$.
- A. N_2O_5 , H_2O_2 , $\text{C}_3\text{H}_2\text{Cl}_2$
B. N_2O_5 , HO, $\text{C}_3\text{H}_2\text{Cl}$
C. N_2O_5 , H_2O , $\text{C}_6\text{H}_4\text{Cl}_2$
D. N_2O_5 , HO, $\text{C}_6\text{H}_4\text{Cl}_2$
E. $\text{NO}_{2.5}$, HO, $\text{C}_3\text{H}_2\text{Cl}$
7. Acetic acid is the active ingredient in vinegar. It consists of 40.00% C, 6.73% H, and 53.28% O. What is the empirical formula of acetic acid?
- A. CH_3O
B. $\text{C}_2\text{H}_4\text{O}_2$
C. $\text{C}_3\text{H}_6\text{O}_3$
D. CH_2O
E. $\text{C}_{3.33}\text{H}_{6.66}\text{O}_{3.33}$
8. Calculate the molarity of a solution consisting of 60.0 g of NaOH in 1.50 L of solution.
- A. 40.0 M
B. 1.50 M
C. 1.60×10^3 M
D. 1.00 M
E. 1.74 M
9. The figure shows the chemical reaction between nitrogen gas and hydrogen gas to produce ammonia (NH_3) gas. Is the diagram accurate, and if not, what is wrong with it, and how could it be fixed?



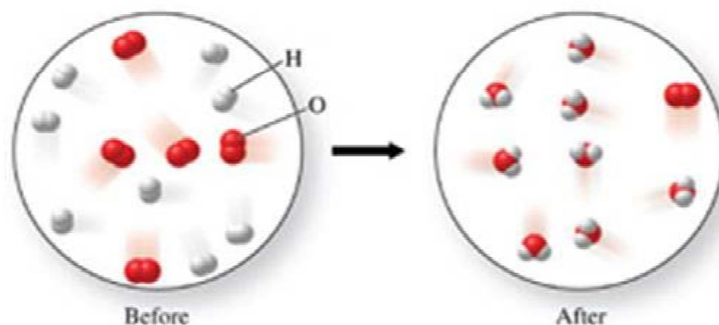
- A. The nitrogen molecules would not break apart, so the image on the right should have two nitrogen atoms in each of two molecules.
B. The diagram is correct as shown.
C. There are not enough hydrogen atoms in the image on the right. Add another hydrogen atom to each molecule on the right.
D. There are not enough hydrogen atoms in either of the two images. Add one more hydrogen molecule to the left image, and one more hydrogen atom to each molecule shown on the right.
E. There are too few hydrogen atoms in the image on the left. Add one hydrogen molecule.

10. Balance the following skeletal equation: $\text{C}_3\text{H}_8(g) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(g)$.
- $\text{C}_3\text{H}_8(g) + \text{O}_2(g) \rightarrow 3\text{CO}_2(g) + 4\text{H}_2\text{O}(g)$
 - $\text{C}_3\text{H}_8(g) + 5\text{O}_2(g) \rightarrow 3\text{CO}_2(g) + 4\text{H}_2\text{O}(g)$
 - $\text{C}_3\text{H}_8(g) + \text{O}_2(g) \rightarrow 3\text{CO}_2(g) + 2\text{H}_2\text{O}(g)$
 - $\text{C}_3\text{H}_8(g) + 3\text{O}_2(g) \rightarrow 3\text{CO}_2(g) + 4\text{H}_2\text{O}(g)$
 - $\text{C}_3\text{H}_8(g) + 4\text{O}_2(g) \rightarrow 3\text{CO}_2(g) + 4\text{H}_2\text{O}(g)$
11. A reaction which has two elements as reactants and one compound as a product is:
- a combination reaction.
 - a decomposition reaction.
 - a double-displacement reaction.
 - a combustion reaction.
 - a single-displacement reaction.
12. A piece of magnesium metal is placed in a solution of hydrochloric acid, resulting in the formation of hydrogen gas and a solution of magnesium chloride. The class of this reaction is:
- combination reaction.
 - single-displacement reaction.
 - double-displacement reaction.
 - decomposition reaction.
 - combustion reaction.
13. The class of the reaction shown in the figure is:



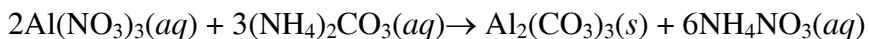
- combustion reaction.
 - single-displacement reaction.
 - combination reaction.
 - decomposition reaction.
 - double-displacement reaction.
14. When copper metal is placed in a solution of zinc nitrate, will a reaction occur? If so, what is the balanced equation for the reaction?
- Yes. $\text{Cu}(s) + \text{Zn}(\text{NO}_3)_2(aq) \rightarrow \text{CuNO}_3(aq) + \text{ZnNO}_3(aq)$
 - Yes. $\text{Cu}(s) + \text{Zn}(\text{NO}_3)_2(aq) \rightarrow \text{Cu}(\text{NO}_3)_2(aq) + \text{Zn}(s)$
 - Yes. $\text{Cu}(s) + \text{Zn}_2\text{NO}_3(aq) \rightarrow \text{CuNO}_3(aq) + 2\text{Zn}(aq)$
 - No reaction will occur.
 - Yes. $\text{Cu}(s) + \text{Zn}_2\text{NO}_3(aq) \rightarrow \text{CuNO}_3(aq) + \text{Zn}(aq)$

15. When aqueous solutions of sodium chloride and silver nitrate are mixed, a double-displacement reaction occurs. What is the balanced equation for the reaction?
- A. $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{NaNO}_3(aq) + \text{AgCl}(aq)$
 B. $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{NaNO}_3(aq) + 3\text{AgCl}(s)$
 C. $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{NaNO}_3(aq) + \text{Ag}(s) + \text{Cl}(g)$
 D. $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{NaNO}_3(aq) + \text{AgCl}(s)$
 E. $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{Na}(s) + \text{AgNO}_3\text{Cl}(aq)$
16. Which of the following ionic compounds would be expected to be **insoluble** in water?
- A. PbI_2
 B. KCl
 C. NH_4NO_3
 D. NaCH_3CO_2
 E. CuSO_4
17. Write and balance a net ionic equation for the reaction between iron(II) chloride and potassium hydroxide to form iron(II) hydroxide and potassium chloride.
- A. $\text{Fe}^{2+}(aq) + 2\text{OH}^-(aq) \rightarrow \text{Fe}(\text{OH})_2(s)$
 B. $2\text{Cl}^-(aq) + 2\text{K}^+(aq) \rightarrow 2\text{KCl}(s)$
 C. $\text{Fe}^{2+}(aq) + \text{OH}^-(aq) \rightarrow \text{FeOH}(s)$
 D. $2\text{Cl}^-(aq) + 2\text{K}^+(aq) \rightarrow 2\text{K}(s) + \text{Cl}_2(g)$
 E. $\text{Fe}_2\text{Cl}(aq) + \text{OH}^-(aq) \rightarrow \text{FeOH}(s) + \text{Cl}^-(aq)$
18. Which of the following is the best (simplest) balanced equation to represent the chemical reaction shown in the figure *on any scale*?



- A. $8\text{H}_2 + 5\text{O}_2 \rightarrow 8\text{H}_2\text{O} + \text{O}_2$
 B. $4\text{H}_2 + 2\text{O}_2 \rightarrow 4\text{H}_2\text{O}$
 C. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 D. $16\text{H} + 10\text{O} \rightarrow 8\text{H}_2\text{O} + \text{O}_2$
 E. $16\text{H} + 10\text{O} \rightarrow 16\text{H} + 10\text{O}$

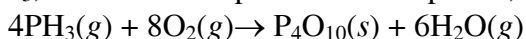
19. When mixed, solutions of aluminum nitrate, $\text{Al}(\text{NO}_3)_3$, and ammonium carbonate, $(\text{NH}_4)_2\text{CO}_3$, will form a precipitate of aluminum carbonate, $\text{Al}_2(\text{CO}_3)_3$. The balanced equation is:



Which of the following statements regarding this reaction is **incorrect**?

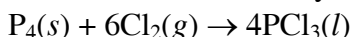
- A. If 6 moles of $(\text{NH}_4)_2\text{CO}_3$ react with sufficient $\text{Al}(\text{NO}_3)_3$, 2 moles of $\text{Al}_2(\text{CO}_3)_3$ will be formed.
- B. 2 moles of $\text{Al}(\text{NO}_3)_3$ will react with 3 moles of $(\text{NH}_4)_2\text{CO}_3$.
- C. If 0.5 mole of $(\text{NH}_4)_2\text{CO}_3$ react with sufficient $\text{Al}(\text{NO}_3)_3$, 3 moles of $\text{Al}_2(\text{CO}_3)_3$ will be formed.
- D. 4 moles of $\text{Al}(\text{NO}_3)_3$ will react with 6 moles of $(\text{NH}_4)_2\text{CO}_3$.
- E. If 1.5 moles of $\text{Al}_2(\text{CO}_3)_3$ are formed, given sufficient starting materials, then 9 moles of NH_4NO_3 will also be formed.

20. Phosphine, PH_3 , a reactive and poisonous compound, reacts with oxygen as follows:



If 9.2 moles of phosphine react with sufficient oxygen, how many moles of P_4O_{10} will be formed?

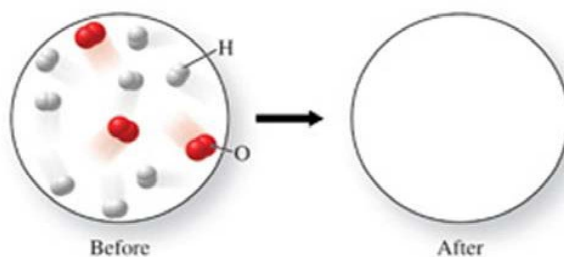
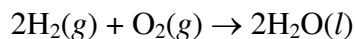
- A. 9.2 moles
- B. 2.3 moles
- C. 37 moles
- D. 6.0 moles
- E. 4.0 moles
21. Phosphorus trichloride can be made by the reaction:



What is the maximum amount of phosphorus trichloride that can be formed if 10 molecules of P_4 react with 36 molecules of chlorine?

- A. 4 molecules
- B. 12 molecules
- C. 24 molecules
- D. 46 molecules
- E. 6 molecules

22. The figure shows a molecular-level diagram of reactant molecules for the reaction:



List the number and formulas of the molecules that will be present after the reaction takes place.

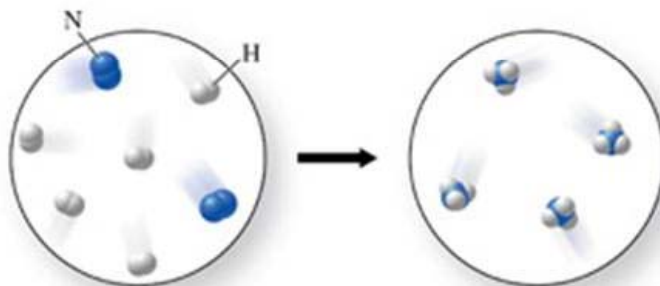
- A. $4\text{H}_2\text{O}$, 4H_2 , O_2
 - B. $2\text{H}_2\text{O}$, 6H_2 , 2O_2
 - C. $3\text{H}_2\text{O}$, 5H_2 , O_2
 - D. $6\text{H}_2\text{O}$, 2H_2
 - E. $6\text{H}_2\text{O}$, 2H_2 , O_2
23. In the process of obtaining lead from PbS , or galena, the galena is "roasted" (heated in the presence of oxygen), so that the following reaction occurs:
- $$2\text{PbS}(\text{s}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{PbO}(\text{s}) + 2\text{SO}_2(\text{g})$$
- If 50.0 g of PbS reacts with 25.0 g of oxygen, how many grams of PbO will be formed?
- A. 69.9 g
 - B. 163 g
 - C. 116 g
 - D. 93.2 g
 - E. 46.6 g
24. Which of the following processes is exothermic?
- A. dry ice (solid CO_2) converting to a gas at room temperature
 - B. evaporation of water from a mud puddle
 - C. ice melting in a beverage
 - D. wax melting on the top of a burning candle
 - E. burning propane in a barbeque grill
25. If 75.0 J of heat energy are added to separate 25.0 g samples of aluminum ($C = 0.895 \text{ J/g}^\circ\text{C}$), chromium ($C = 0.450 \text{ J/g}^\circ\text{C}$), and copper ($C = 0.377 \text{ J/g}^\circ\text{C}$), rank the metals in order from least to greatest final temperature.
- A. $\text{Al} < \text{Cu} < \text{Cr}$
 - B. $\text{Cr} < \text{Cu} < \text{Al}$
 - C. none of these—all final temperatures would be equal
 - D. $\text{Cu} < \text{Cr} < \text{Al}$
 - E. $\text{Al} < \text{Cr} < \text{Cu}$

Exam 2 Version 1 **Key**

1. E
2. C
3. A or D
4. C
5. A
6. B
7. D
8. D
9. E
10. B
11. A
12. B
13. D
14. D
15. D
16. A
17. A
18. C
19. C
20. B
21. C
22. D
23. E
24. E
25. E

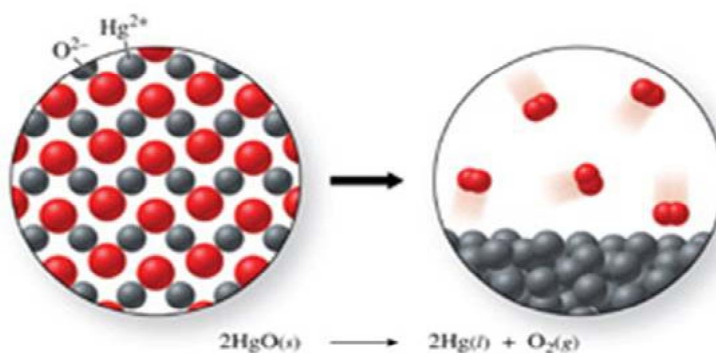
- Which of the following statements is **incorrect**?
 - SO_2 has twice as many oxygen atoms as sulfur atoms.
 - N_2H_4 has four times as many hydrogen atoms as nitrogen atoms.
 - H_2SO_4 has twice as many oxygen atoms as hydrogen atoms.
 - SF_4 has $\frac{1}{4}$ as many sulfur atoms as fluorine atoms.
 - $\text{Ca}(\text{NO}_3)_2$ has six times as many oxygen atoms as calcium ions.
- How many oxygen atoms are there in 0.25 mole of CO_2 ?
 - 1.5×10^{23}
 - 0.50
 - 0.25
 - 4.2×10^{-25}
 - 3.0×10^{23}
- Rank the following in order of increasing mass: 0.50 mole of water (H_2O), 0.20 mole of Fe, and 0.010 mole of U.
 - $\text{H}_2\text{O} < \text{Fe} < \text{U}$
 - $\text{U} < \text{H}_2\text{O} < \text{Fe}$
 - $\text{U} < \text{H}_2\text{O} < \text{Fe}$
 - $\text{H}_2\text{O} < \text{U} < \text{Fe}$
 - $\text{U} < \text{Fe} < \text{H}_2\text{O}$
- A 5.05 g sample of quartz (SiO_2) contains 2.36 g of silicon. What are the percents of silicon and oxygen in quartz?
 - 29.9% Si and 70.1% O
 - 53.3% Si and 46.7% O
 - 46.7% Si, and insufficient information to calculate % O
 - 46.7% Si and 53.3% O
 - 70.1% Si and 29.9% O
- Calculate the number of moles of NaOH (sodium hydroxide, an ingredient in drain cleaners and oven cleaners) in a 10.0 g sample of this substance.
 - 0.208 mole
 - 0.250 mole
 - 1.66×10^{23} mole
 - 4.00×10^2 moles
 - 1.51×10^{23} moles
- Given the following molecular formulas, determine the empirical formula of each compound:
 $\text{N}_2\text{O}_5, \text{H}_2\text{O}_2, \text{C}_6\text{H}_4\text{Cl}_2$.
 - $\text{N}_2\text{O}_5, \text{H}_2\text{O}, \text{C}_6\text{H}_4\text{Cl}_2$
 - $\text{N}_2\text{O}_5, \text{H}_2\text{O}_2, \text{C}_3\text{H}_2\text{Cl}_2$
 - $\text{NO}_{2.5}, \text{HO}, \text{C}_3\text{H}_2\text{Cl}$
 - $\text{N}_2\text{O}_5, \text{HO}, \text{C}_6\text{H}_4\text{Cl}_2$
 - $\text{N}_2\text{O}_5, \text{HO}, \text{C}_3\text{H}_2\text{Cl}$

7. Acetic acid is the active ingredient in vinegar. It consists of 40.00% C, 6.73% H, and 53.28% O. What is the empirical formula of acetic acid?
- $C_{3.33}H_{6.66}O_{3.33}$
 - $C_3H_6O_3$
 - $C_2H_4O_2$
 - CH_2O
 - CH_3O
8. Calculate the molarity of a solution consisting of 60.0 g of NaOH in 1.50 L of solution.
- 1.50 M
 - $1.60 \times 10^3 M$
 - 40.0 M
 - 1.00 M
 - 1.74 M
9. The figure shows the chemical reaction between nitrogen gas and hydrogen gas to produce ammonia (NH_3) gas. Is the diagram accurate, and if not, what is wrong with it, and how could it be fixed?



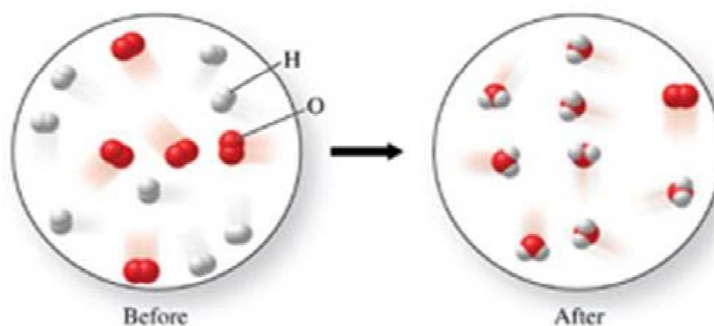
- There are too few hydrogen atoms in the image on the left. Add one hydrogen molecule.
 - There are not enough hydrogen atoms in the image on the right. Add another hydrogen atom to each molecule on the right.
 - The diagram is correct as shown.
 - There are not enough hydrogen atoms in either of the two images. Add one more hydrogen molecule to the left image, and one more hydrogen atom to each molecule shown on the right.
 - The nitrogen molecules would not break apart, so the image on the right should have two nitrogen atoms in each of two molecules.
10. Balance the following skeletal equation: $C_3H_8(g) + O_2(g) \rightarrow CO_2(g) + H_2O(g)$.
- $C_3H_8(g) + 3O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$
 - $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$
 - $C_3H_8(g) + O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$
 - $C_3H_8(g) + O_2(g) \rightarrow 3CO_2(g) + 2H_2O(g)$
 - $C_3H_8(g) + 4O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$

11. A reaction which has two elements as reactants and one compound as a product is:
- a combination reaction.
 - a single-displacement reaction.
 - a combustion reaction.
 - a double-displacement reaction.
 - a decomposition reaction.
12. A piece of magnesium metal is placed in a solution of hydrochloric acid, resulting in the formation of hydrogen gas and a solution of magnesium chloride. The class of this reaction is:
- decomposition reaction.
 - double-displacement reaction.
 - single-displacement reaction.
 - combustion reaction.
 - combination reaction.
13. The class of the reaction shown in the figure is:



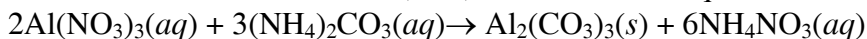
- double-displacement reaction.
 - single-displacement reaction.
 - decomposition reaction.
 - combustion reaction.
 - combination reaction.
14. When copper metal is placed in a solution of zinc nitrate, will a reaction occur? If so, what is the balanced equation for the reaction?
- Yes. $\text{Cu}(s) + \text{Zn}(\text{NO}_3)_2(aq) \rightarrow \text{CuNO}_3(aq) + \text{ZnNO}_3(aq)$
 - Yes. $\text{Cu}(s) + \text{Zn}_2\text{NO}_3(aq) \rightarrow \text{CuNO}_3(aq) + \text{Zn}(aq)$
 - Yes. $\text{Cu}(s) + \text{Zn}_2\text{NO}_3(aq) \rightarrow \text{CuNO}_3(aq) + 2\text{Zn}(aq)$
 - Yes. $\text{Cu}(s) + \text{Zn}(\text{NO}_3)_2(aq) \rightarrow \text{Cu}(\text{NO}_3)_2(aq) + \text{Zn}(s)$
 - No reaction will occur.

15. When aqueous solutions of sodium chloride and silver nitrate are mixed, a double-displacement reaction occurs. What is the balanced equation for the reaction?
- $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{NaNO}_3(aq) + \text{AgCl}(s)$
 - $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{Na}(s) + \text{AgNO}_3\text{Cl}(aq)$
 - $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{NaNO}_3(aq) + 3\text{AgCl}(s)$
 - $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{NaNO}_3(aq) + \text{Ag}(s) + \text{Cl}(g)$
 - $\text{NaCl}(aq) + \text{AgNO}_3(aq) \rightarrow \text{NaNO}_3(aq) + \text{AgCl}(aq)$
16. Which of the following ionic compounds would be expected to be **insoluble** in water?
- KCl
 - NH_4NO_3
 - NaCH_3CO_2
 - PbI_2
 - CuSO_4
17. Write and balance a net ionic equation for the reaction between iron(II) chloride and potassium hydroxide to form iron(II) hydroxide and potassium chloride.
- $\text{Fe}_2\text{Cl}(aq) + \text{OH}^-(aq) \rightarrow \text{FeOH}(s) + \text{Cl}^-(aq)$
 - $\text{Fe}^{2+}(aq) + 2\text{OH}^-(aq) \rightarrow \text{Fe}(\text{OH})_2(s)$
 - $\text{Fe}^{2+}(aq) + \text{OH}^-(aq) \rightarrow \text{FeOH}(s)$
 - $2\text{Cl}^-(aq) + 2\text{K}^+(aq) \rightarrow 2\text{K}(s) + \text{Cl}_2(g)$
 - $2\text{Cl}^-(aq) + 2\text{K}^+(aq) \rightarrow 2\text{KCl}(s)$
18. Which of the following is the best (simplest) balanced equation to represent the chemical reaction shown in the figure *on any scale*?



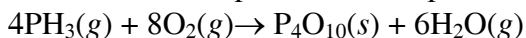
- $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- $8\text{H}_2 + 5\text{O}_2 \rightarrow 8\text{H}_2\text{O} + \text{O}_2$
- $4\text{H}_2 + 2\text{O}_2 \rightarrow 4\text{H}_2\text{O}$
- $16\text{H} + 10\text{O} \rightarrow 8\text{H}_2\text{O} + \text{O}_2$
- $16\text{H} + 10\text{O} \rightarrow 16\text{H} + 10\text{O}$

19. When mixed, solutions of aluminum nitrate, $\text{Al}(\text{NO}_3)_3$, and ammonium carbonate, $(\text{NH}_4)_2\text{CO}_3$, will form a precipitate of aluminum carbonate, $\text{Al}_2(\text{CO}_3)_3$. The balanced equation is:



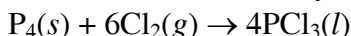
Which of the following statements regarding this reaction is **incorrect**?

- A. If 0.5 mole of $(\text{NH}_4)_2\text{CO}_3$ react with sufficient $\text{Al}(\text{NO}_3)_3$, 3 moles of $\text{Al}_2(\text{CO}_3)_3$ will be formed.
 B. If 1.5 moles of $\text{Al}_2(\text{CO}_3)_3$ are formed, given sufficient starting materials, then 9 moles of NH_4NO_3 will also be formed.
 C. If 6 moles of $(\text{NH}_4)_2\text{CO}_3$ react with sufficient $\text{Al}(\text{NO}_3)_3$, 2 moles of $\text{Al}_2(\text{CO}_3)_3$ will be formed.
 D. 2 moles of $\text{Al}(\text{NO}_3)_3$ will react with 3 moles of $(\text{NH}_4)_2\text{CO}_3$.
 E. 4 moles of $\text{Al}(\text{NO}_3)_3$ will react with 6 moles of $(\text{NH}_4)_2\text{CO}_3$.
20. Phosphine, PH_3 , a reactive and poisonous compound, reacts with oxygen as follows:



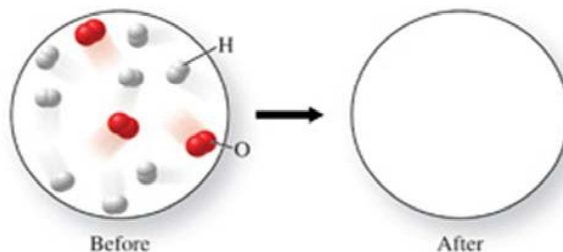
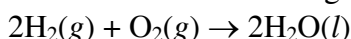
If 9.2 moles of phosphine react with sufficient oxygen, how many moles of P_4O_{10} will be formed?

- A. 6.0 moles
 B. 9.2 moles
 C. 4.0 moles
 D. 37 moles
 E. 2.3 moles
21. Phosphorus trichloride can be made by the reaction:



What is the maximum amount of phosphorus trichloride that can be formed if 10 molecules of P_4 react with 36 molecules of chlorine?

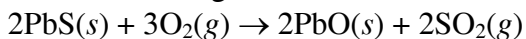
- A. 6 molecules
 B. 46 molecules
 C. 24 molecules
 D. 4 molecules
 E. 12 molecules
22. The figure shows a molecular-level diagram of reactant molecules for the reaction:



List the number and formulas of the molecules that will be present after the reaction takes place.

- A. $2\text{H}_2\text{O}$, 6H_2 , 2O_2
 B. $6\text{H}_2\text{O}$, 2H_2 , O_2
 C. $3\text{H}_2\text{O}$, 5H_2 , O_2
 D. $4\text{H}_2\text{O}$, 4H_2 , O_2
 E. $6\text{H}_2\text{O}$, 2H_2

23. In the process of obtaining lead from PbS, or galena, the galena is "roasted" (heated in the presence of oxygen), so that the following reaction occurs:



If 50.0 g of PbS reacts with 25.0 g of oxygen, how many grams of PbO will be formed?

- A. 93.2 g
- B. 46.6 g
- C. 69.9 g
- D. 163 g
- E. 116 g

24. Which of the following processes is exothermic?

- A. dry ice (solid CO_2) converting to a gas at room temperature
- B. wax melting on the top of a burning candle
- C. ice melting in a beverage
- D. burning propane in a barbeque grill
- E. evaporation of water from a mud puddle

25. If 75.0 J of heat energy are added to separate 25.0 g samples of aluminum ($C = 0.895 \text{ J/g}^\circ\text{C}$), chromium ($C = 0.450 \text{ J/g}^\circ\text{C}$), and copper ($C = 0.377 \text{ J/g}^\circ\text{C}$), rank the metals in order from least to greatest final temperature.

- A. $\text{Al} < \text{Cr} < \text{Cu}$
- B. none of these—all final temperatures would be equal
- C. $\text{Cu} < \text{Cr} < \text{Al}$
- D. $\text{Cr} < \text{Cu} < \text{Al}$
- E. $\text{Al} < \text{Cu} < \text{Cr}$

Exam 2 Version 2 **Key**

1. B
2. E
3. C or B
4. D
5. B
6. E
7. D
8. D
9. A
10. B
11. A
12. C
13. C
14. E
15. A
16. D
17. B
18. A
19. A
20. E
21. C
22. E
23. B
24. D
25. A