

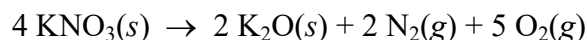
**Stoic. Study Guide****Multiple Choice**

Identify the choice that best completes the statement or answers the question. Please show all work for full credit.

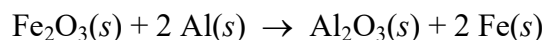
- \_\_\_\_\_ 1. How many molecules of  $\text{N}_2\text{O}_4$  are in 76.3 g  $\text{N}_2\text{O}_4$ ? The molar mass of  $\text{N}_2\text{O}_4$  is 92.02 g/mol.
- $5.54 \times 10^{25}$   $\text{N}_2\text{O}_4$  molecules
  - $7.26 \times 10^{23}$   $\text{N}_2\text{O}_4$  molecules
  - $1.38 \times 10^{24}$   $\text{N}_2\text{O}_4$  molecules
  - $4.59 \times 10^{25}$   $\text{N}_2\text{O}_4$  molecules
  - $4.99 \times 10^{23}$   $\text{N}_2\text{O}_4$  molecules
- \_\_\_\_\_ 2. How many moles of  $\text{N}_2\text{O}_4$  are in 76.3 g  $\text{N}_2\text{O}_4$ ? The molar mass of  $\text{N}_2\text{O}_4$  is 92.02 g/mol.
- $7.02 \times 10^3$  moles
  - $1.42 \times 10^{-4}$  moles
  - 1.00 mole
  - 1.21 moles
  - 0.829 moles
- \_\_\_\_\_ 3. Determine the number of moles of sodium in 3.20 moles of sodium hydrogen phosphate.
- 6.40 moles of sodium
  - 3.20 moles of sodium
  - 9.60 moles of sodium
  - 1.60 moles of sodium
  - 12.80 moles of sodium
- \_\_\_\_\_ 4. How many atoms of oxygen are contained in 47.6 g of  $\text{Al}_2(\text{CO}_3)_3$ ? The molar mass of  $\text{Al}_2(\text{CO}_3)_3$  is 233.99 g/mol.
- $1.23 \times 10^{23}$  O atoms
  - $2.96 \times 10^{24}$  O atoms
  - $2.87 \times 10^{25}$  O atoms
  - $1.10 \times 10^{24}$  O atoms
  - $3.68 \times 10^{23}$  O atoms
- \_\_\_\_\_ 5. How many molecules of butane are contained in 25.0 mL of butane? The density of butane is 0.6011 g/mL and the molar mass is 58.12 g/mol.
- $2.59 \times 10^{23}$  molecules butane
  - $1.46 \times 10^{27}$  molecules butane
  - $6.87 \times 10^{23}$  molecules butane
  - $1.56 \times 10^{23}$  molecules butane
  - $7.14 \times 10^{25}$  molecules butane

- \_\_\_\_\_ 6. Determine the molecular formula of a compound that has a molar mass of 183.2 g/mol and an empirical formula of  $C_2H_5O_2$ .
- $C_2H_5O_2$
  - $C_6H_{15}O_6$
  - $C_3H_7O_3$
  - $C_4H_{10}O_4$
  - $C_8H_{20}O_8$
- \_\_\_\_\_ 7. Determine the empirical formula for a compound that is 36.86% N and 63.14% O by mass.
- NO
  - $N_2O$
  - $NO_2$
  - $N_2O_3$
  - $NO_3$
- \_\_\_\_\_ 8. Determine the empirical formula for a compound that is 70.79% carbon, 8.91% hydrogen, 4.59% nitrogen, and 15.72% oxygen.
- $C_{18}H_{27}NO_3$
  - $C_{18}H_{27}NO_2$
  - $C_{17}H_{27}NO_3$
  - $C_{17}H_{26}NO_3$
- \_\_\_\_\_ 9. Write a **balanced** equation to show the reaction of gaseous ethane with gaseous oxygen to form carbon monoxide gas and water vapor.
- $2 C_2H_6(g) + 7 O_2(g) \rightarrow 4 CO_2(g) + 6 H_2O(g)$
  - $C_2H_6(g) + 5 O(g) \rightarrow 2 CO(g) + 3 H_2O(g)$
  - $2 C_2H_6(g) + 5 O_2(g) \rightarrow 4 CO(g) + 6 H_2O(g)$
  - $C_2H_6(g) + 7 O(g) \rightarrow 2 CO_2(g) + 3 H_2O(g)$
  - $2 CH_3(g) + 5 O(g) \rightarrow 2 CO(g) + 3 H_2O(g)$
- \_\_\_\_\_ 10. Write a **balanced** equation to show the reaction of aqueous aluminum acetate with aqueous ammonium phosphate to form solid aluminum phosphate and aqueous ammonium acetate.
- $Al(C_2H_3O_2)_2(aq) + (NH_4)_2PO_4(aq) \rightarrow AlPO_4(s) + 2 NH_4C_2H_3O_2(aq)$
  - $Al(C_2H_3O_2)_2(aq) + (NH_3)_2PO_4(aq) \rightarrow AlPO_4(s) + 2 NH_3C_2H_3O_2(aq)$
  - $Al(CO_3)_2(aq) + (NH_3)_2PO_4(aq) \rightarrow AlPO_4(s) + 2 NH_3CO_3(aq)$
  - $Al(C_2H_3O_2)_3(aq) + (NH_4)_3PO_4(aq) \rightarrow AlPO_4(s) + 3 NH_4C_2H_3O_2(aq)$
  - $Al(CO_2)_3(aq) + (NH_4)_3PO_3(aq) \rightarrow AlPO_3(s) + 3 NH_4CO_2(aq)$
- \_\_\_\_\_ 11. What is the mass of  $8.00 \times 10^{22}$  molecules of  $NH_3$ ?
- 0.00780 g
  - 0.442 g
  - 2.26 g
  - 128 g

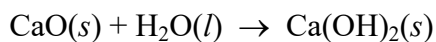
- \_\_\_\_\_ 12. Give the mass percent of carbon in  $C_{14}H_{19}NO_2$ .
- 72.07%
  - 8.21%
  - 6.00%
  - 13.72%
- \_\_\_\_\_ 13. How many moles of nitrogen are formed when 58.6 g of  $KNO_3$  decomposes according to the following reaction? The molar mass of  $KNO_3$  is 101.11 g/mol.



- 0.290 mol  $N_2$
  - 0.580 mol  $N_2$
  - 18.5 mol  $N_2$
  - 0.724 mol  $N_2$
  - 1.73 mol  $N_2$
- \_\_\_\_\_ 14. A 14.01 g sample of  $N_2$  reacts with 3.02 g of  $H_2$  to form ammonia ( $NH_3$ ). If ammonia is the only product, what mass of ammonia is formed?
- 17.01 g
  - 1.10 g
  - 14.01 g
  - 3.02 g
  - 23.07 g
- \_\_\_\_\_ 15. Determine the percent yield of a reaction that produces 28.65 g of Fe when 50.00 g of  $Fe_2O_3$  react with excess Al according to the following reaction.

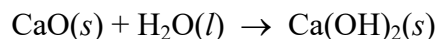


- 61.03%
  - 28.65%
  - 57.30%
  - 20.02%
  - 81.93%
- \_\_\_\_\_ 16. According to the following balanced reaction, how many moles of  $Ca(OH)_2$  will be formed from 3.22 moles of  $H_2O$ ?



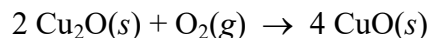
- 3.22 moles of  $Ca(OH)_2$
- 6.44 moles of  $Ca(OH)_2$
- 12.9 moles of  $Ca(OH)_2$
- 1.61 moles of  $Ca(OH)_2$
- 0.53 moles of  $Ca(OH)_2$

\_\_\_\_\_ 17. How many grams of water react to form 6.21 moles of  $\text{Ca(OH)}_2$ ?



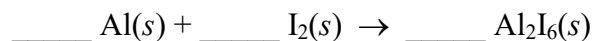
- a. 6.21 g of  $\text{H}_2\text{O}$
- b. 24.8 g of  $\text{H}_2\text{O}$
- c. 49.7 g of  $\text{H}_2\text{O}$
- d. 112 g of  $\text{H}_2\text{O}$
- e. 99.4 g of  $\text{H}_2\text{O}$

\_\_\_\_\_ 18. How many moles of  $\text{CuO}$  can be produced from 0.450 mol of  $\text{Cu}_2\text{O}$  in the following reaction?



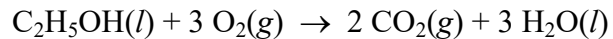
- a. 0.225 mol
- b. 0.450 mol
- c. 0.900 mol
- d. 1.80 mol
- e. 63.2 mol

\_\_\_\_\_ 19. Balance the chemical equation given below, and determine the number of moles of iodine that react with 40.0 g of aluminum.



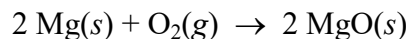
- a. 0.988 mol
- b. 2.22 mol
- c. 2.97 mol
- d. 4.45 mol

\_\_\_\_\_ 20. The density of ethanol,  $\text{C}_2\text{H}_5\text{OH}$ , is 0.789 g/mL. How many milliliters of ethanol are needed to produce 30.0 g of  $\text{CO}_2$  according to the following chemical equation?



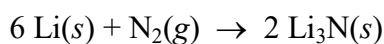
- a. 12.4 mL
- b. 19.9 mL
- c. 39.8 mL
- d. 79.6 mL

- \_\_\_ 21. Magnesium burns in air with a dazzling brilliance to produce magnesium oxide:



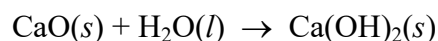
When 3.50 g of magnesium burns, the theoretical yield of magnesium oxide is \_\_\_\_\_ g.

- a. 3.50
  - b. 5.80
  - c. 0.144
  - d. 2.90
  - e. 11.6
- \_\_\_ 22. Lithium and nitrogen react in a combination reaction to produce lithium nitride:



In a particular experiment, 1.50-g samples of each reagent are reacted. The theoretical yield of lithium nitride is \_\_\_\_\_ g.

- a. 1.51
  - b. 1.25
  - c. 7.5
  - d. 2.51
  - e. 3.7
- \_\_\_ 23. Calcium oxide reacts with water in a combination reaction to produce calcium hydroxide:



In a particular experiment, a 2.50-g sample of CaO is reacted with excess water and 2.80 g of Ca(OH)<sub>2</sub> is recovered. What is the percent yield in this experiment?

- a. 112
- b. 1.12
- c. 3.60
- d. 84.9
- e. 89.2