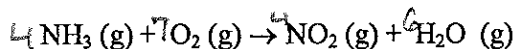


AP Chem Chapter 3 BLM 11th

Multiple Choice

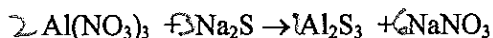
Identify the choice that best completes the statement or answers the question.

- ____ 1. When the following equation is balanced, the coefficients are _____.



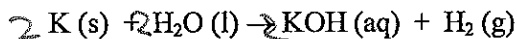
- a. 1, 1, 1, 1
- b. 4, 7, 4, 6
- c. 2, 3, 2, 3
- d. 1, 3, 1, 2
- e. 4, 3, 4, 3

- ____ 2. When the following equation is balanced, the coefficients are _____.



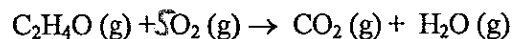
- a. 2, 3, 1, 6
- b. 2, 1, 3, 2
- c. 1, 1, 1, 1
- d. 4, 6, 3, 2
- e. 2, 3, 2, 3

- ____ 3. When the following equation is balanced, the coefficient of H_2 is _____.



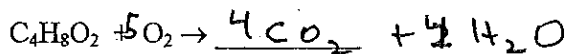
- a. 1
- b. 2
- c. 3
- d. 4
- e. 5

- ____ 4. When the following equation is balanced, the coefficient of O_2 is _____.



- a. 2
- b. 3
- c. 4
- d. 5
- e. 1

5. What is the coefficient of O_2 when the following equation is completed and balanced?



- a. 2
- b. 3
- c. 5
- d. 6
- e. 1

6. Which of the following are combustion reactions?

- 1) $CH_4(g) + O_2(g) \rightarrow CO_2(g) + H_2O(l)$
- 2) $CaO(s) + CO_2(g) \rightarrow CaCO_3(s)$
- 3) $PbCO_3(s) \rightarrow PbO(s) + CO_2(g)$
- 4) $CH_3OH(l) + O_2(g) \rightarrow CO_2(g) + H_2O(l)$

- a. 1 and 4
- b. 1, 2, 3, and 4
- c. 1, 3, and 4
- d. 2, 3, and 4
- e. 3 and 4

7. Which of the following are decomposition reactions?

- 1) $CH_4(g) + O_2(g) \rightarrow CO_2(g) + H_2O(l)$
- 2) $CaO(s) + CO_2(g) \rightarrow CaCO_3(s)$
- 3) $Mg(s) + O_2(g) \rightarrow MgO(s)$
- 4) $PbCO_3(s) \rightarrow PbO(s) + CO_2(g)$

- a. 1, 2, and 3
- b. 4 only
- c. 1, 2, 3, and 4
- d. 2 and 3
- e. 2, 3, and 4

8. The formula weight of aluminum sulfate ($Al_2(SO_4)_3$) is _____ amu.

- a. 342.15
- b. 123.04
- c. 59.04
- d. 150.14
- e. 273.06

$$\begin{array}{l} Al \quad 2 \times 26.98 = \\ S \quad 3 \times 32.065 = \\ O \quad 12 \times 16.00 = \end{array}$$

9. The molecular weight of glucose ($C_6H_{12}O_6$), rounded to the nearest integer, is _____ amu.

- a. 24
- b. 96
- c. 136
- d. 180
- e. 224

10. The mass % of Al in aluminum sulfate ($\text{Al}_2(\text{SO}_4)_3$) is _____.
 a. 7.886
 b. 15.77
 c. 21.93
 d. 45.70
 e. 35.94

$$\frac{(26.98 \times 2)}{34.151} \times 100\% = 15.77\%$$
11. The mass % of C in methane (CH_4) is _____.
 a. 25.13
 b. 133.6
 c. 74.87
 d. 92.26
 e. 7.743

$$\frac{12.01\text{g}}{16.04\text{g}} \times 100\% = 74.86\%$$
12. Calculate the percentage by mass of oxygen in $\text{Pb}(\text{NO}_3)_2$.
 a. 9.7
 b. 14.5
 c. 19.3
 d. 29.0
 e. 33.4

$$\frac{96\text{g}}{331.2\text{g}} \times 100\% = 28.98\%$$
13. One mole of _____ contains the largest number of atoms.
 a. S_8
 b. C_{10}H_8
 c. $\text{Al}_2(\text{SO}_4)_3$
 d. Na_3PO_4
 e. Cl_2
14. How many molecules of CH_4 are in 48.2 g of this compound?
 a. 5.00×10^{24}
 b. 3.00
 c. 2.90×10^{25}
 d. 1.81×10^{24}
 e. 4.00

$$\frac{48.2\text{g CH}_4}{16.04\text{g CH}_4} \times \frac{1\text{ mole CH}_4}{1\text{ mole}} = 6.02 \times 10^{23}\text{ molecules}$$
15. A 30.5 gram sample of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) contains _____ mol of glucose.
 a. 0.424
 b. 0.169
 c. 5.90
 d. 2.36
 e. 0.136

$$\frac{30.5\text{g C}_6\text{H}_{12}\text{O}_6}{180\text{g C}_6\text{H}_{12}\text{O}_6} = 1\text{ mole C}_6\text{H}_{12}\text{O}_6$$
16. A sample of CH_2F_2 with a mass of 19 g contains _____ atoms of F.
 a. 2.2×10^{23}
 b. 38
 c. 3.3×10^{24}
 d. 4.4×10^{23}
 e. 9.5

$$\frac{19\text{g CH}_2\text{F}_2}{52.02\text{g CH}_2\text{F}_2} \times \frac{1\text{ mole CH}_2\text{F}_2}{1\text{ mole}} \times 2 \times 6.022 \times 10^{23}\text{ F} = 4.4 \times 10^{23}\text{ F}$$

17. How many moles of pyridine (C₅H₅N) are contained in 3.13 g of pyridine?

- a. 0.0396
- b. 25.3
- c. 0.319
- d. 0.00404
- e. 4.04 × 10³

$$\frac{3.13 \text{ g C}_5\text{H}_5\text{N}}{79.1 \text{ g C}_5\text{H}_5\text{N}} \times 1 \text{ mol} = 0.0396 \text{ mol}$$

18. How many carbon atoms are there in 52.06 g of carbon dioxide?

- a. 5.206 × 10²⁴
- b. 3.134 × 10²⁵
- c. 7.122 × 10²³
- d. 8.648 × 10⁻²³
- e. 1.424 × 10²⁴

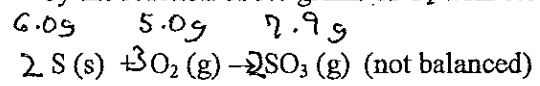
$$\frac{52.06 \text{ g CO}_2}{44.0 \text{ g CO}_2} \times \frac{1 \text{ mol CO}_2}{1 \text{ mol CO}_2} \times \frac{1 \text{ mole C}}{1 \text{ mole C}} = 7.122 \times 10^{23}$$

19. A sulfur oxide is 50.0% by mass sulfur. This molecular formula could be _____.

- a. SO
- b. SO₂
- c. S₂O
- d. S₂O₄
- e. either SO₂ or S₂O₄

$$\frac{32 \text{ g S}}{64 \text{ g SO}_2} = 50\%$$

20. Sulfur and oxygen react to produce sulfur trioxide. In a particular experiment, 7.9 grams of SO₃ are produced by the reaction of 5.0 grams of O₂ with 6.0 grams of S. What is the % yield of SO₃ in this experiment?



$$\frac{6.0 \text{ g S}}{32.0 \text{ g S}} \times \frac{1 \text{ mol S}}{2 \text{ mol S}} \times \frac{2 \text{ mol SO}_3}{1 \text{ mol S}} \times \frac{80.06 \text{ g}}{1 \text{ mol SO}_3} = 15.0 \text{ g SO}_3$$

$$\frac{5.0 \text{ g O}_2}{32 \text{ g O}_2} \times \frac{1 \text{ mol O}_2}{3 \text{ mol O}_2} \times \frac{2 \text{ mol SO}_3}{1 \text{ mol O}_2} \times \frac{80.06 \text{ g}}{1 \text{ mol SO}_3} = 8.3 \text{ g SO}_3$$

$$\frac{7.9}{8.3} \times 100\% = 95\%$$

21. Propane (C₃H₈) reacts with oxygen in the air to produce carbon dioxide and water. In a particular experiment, 38.0 grams of carbon dioxide are produced from the reaction of 22.05 grams of propane with excess oxygen. What is the % yield in this reaction?

- a. 38.0
- b. 57.6
- c. 66.0
- d. 86.4
- e. 94.5

$$\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$$

$$\frac{22.05 \text{ g C}_3\text{H}_8}{44 \text{ g C}_3\text{H}_8} \times \frac{1 \text{ mole C}_3\text{H}_8}{1 \text{ mole C}_3\text{H}_8} \times \frac{3 \text{ mol CO}_2}{1 \text{ mole C}_3\text{H}_8} \times \frac{44.0 \text{ g CO}_2}{1 \text{ mole CO}_2} = 66.15 \text{ g}$$

$$\frac{38.0 \text{ g}}{66.15 \text{ g}} \times 100\% = 57.4\%$$

22. What is the empirical formula of a compound that is 62.0% C, 10.4% H, and 27.5% O by mass?

- a. C₃HO
- b. C₆HO₃
- c. C₆H₁₂O₂
- d. C₃H₁₀O₂
- e. C₃H₆O

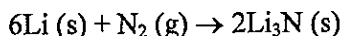
assume 100g

$$\text{C } \frac{62.0 \text{ g}}{12 \text{ g}} = 5.16 = 3$$

$$\text{H } \frac{10.4 \text{ g}}{1} = 10.4 = 6$$

$$\text{O } \frac{27.5 \text{ g}}{16} = 1.72 = 1$$

23. Lithium and nitrogen react in a combination reaction to produce lithium nitride:

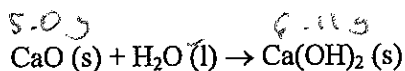


How many moles of lithium are needed to produce 0.60 mol of Li_3N when the reaction is carried out in the presence of excess nitrogen?

- a. 0.30
 b. 1.8
 c. 0.20
 d. 0.40
 e. 3.6

$$0.6 \text{ mol Li}_3\text{N} \left| \frac{6 \text{ mol Li}}{2 \text{ mol Li}_3\text{N}} \right.$$

24. Calcium oxide reacts with water in a combination reaction to produce calcium hydroxide:



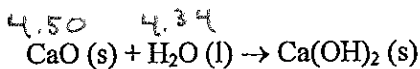
In a particular experiment, a 5.00-g sample of CaO is reacted with excess water and 6.11 g of Ca(OH)_2 is recovered. What is the percent yield in this experiment?

- a. 122
 b. 1.22
 c. 7.19
 d. 92.5
 e. 81.9

$$\frac{5.0\text{g CaO} \left| \frac{1 \text{ mol CaO}}{56\text{g CaO}} \right| \frac{1 \text{ mol Ca(OH)}_2}{1 \text{ mol CaO}} \left| \frac{74.1\text{g Ca(OH)}_2}{1 \text{ mol Ca(OH)}_2} \right.}{1 \text{ mol Ca(OH)}_2} = 6.62\text{g}$$

$$\frac{6.11\text{g}}{6.62\text{g}} \times 100\% = \boxed{92.5\%}$$

25. Calcium oxide reacts with water in a combination reaction to produce calcium hydroxide:



A 4.50-g sample of CaO is reacted with 4.34 g of H_2O . How many grams of water remains after completion of reaction?

- a. 0.00
 b. 0.00892
 c. 2.90
 d. 1.04
 e. 0.161

$$\frac{4.50\text{g CaO} \left| \frac{1 \text{ mol CaO}}{56\text{g CaO}} \right| \frac{1 \text{ mol H}_2\text{O}}{1 \text{ mol CaO}} \left| \frac{18\text{g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \right.}{1 \text{ mol H}_2\text{O}}$$

$$4.34 - 1.44 = \boxed{2.90\text{g}}$$

= 1.44 g H_2O
 one needed
 to react
 with 4.50 g of
 CaO