



6. given: 46.6 g Na_3PO_3 need: ? molecules
 → molar mass of $\text{Na}_3\text{PO}_3 = 147.97 \text{ g/mol}$

$$46.6 \text{ g Na}_3\text{PO}_3 \times \frac{6.022 \times 10^{23} \text{ molecules}}{147.97 \text{ g}} = \boxed{1.90 \times 10^{23} \text{ molecules}}$$

7. a) given 12.04×10^{23} molecules need: ? moles

$$12.04 \times 10^{23} \text{ molecules} \times \frac{1 \text{ mole}}{6.022 \times 10^{23} \text{ molecules}} = \boxed{1.999 \text{ moles}}$$

b) given: 12.04×10^{23} molecules AgBr need: grams
 molar mass of $\text{AgBr} = 187.80 \text{ g/mol}$

$$12.04 \times 10^{23} \text{ molecules} \times \frac{187.80 \text{ g}}{6.022 \times 10^{23} \text{ molecules}} = \boxed{375.4 \text{ g AgBr}}$$

8. given: 20.45g CaSO_4 need: moles
molar mass of $\text{CaSO}_4 = 136.15 \text{ g/mol}$

$$20.45 \text{ g} \times \frac{1 \text{ mole}}{136.15 \text{ g}} = \boxed{0.1502 \text{ moles}}$$

9. given: 250.2g Fe_2O_3 need: moles
molar mass of $\text{Fe}_2\text{O}_3 = 159.70 \text{ g/mol}$

$$250.2 \text{ g} \text{ Fe}_2\text{O}_3 \times \frac{1 \text{ mole}}{159.70 \text{ g}} = \boxed{1.567 \text{ moles}}$$

Fe_2O_3

55.85
55.85
16.00
16.00
16.00

10. given: 25.9g SO_2 need: molecules
molar mass $\text{SO}_2 = 64.07 \text{ g/mol}$

$$25.9 \text{ g} \text{ SO}_2 \times \frac{6.022 \times 10^{23} \text{ molecules}}{64.07 \text{ g}} = \boxed{2.43 \times 10^{23} \text{ molecules}}$$

11. ~~68.3~~ given: 68.3g H_2S need: liters
molar mass = 34.09 g/mol

$$68.3 \text{ g} \text{ H}_2\text{S} \times \frac{22.4 \text{ L}}{34.09 \text{ g}} = \boxed{44.9 \text{ L}}$$

1.01
1.01
32.07
34.09 g/mol

12. given: 48.0L Cl_2 need: molecules

$$48.0 \text{ L} \times \frac{6.022 \times 10^{23} \text{ molecules}}{22.4 \text{ L}} = \boxed{1.29 \times 10^{24} \text{ molecules}}$$

13. given: 4.86×10^{19} molecules Hg_2S need: ? grams

$$4.86 \times 10^{19} \text{ molec. Hg}_2\text{S} \times \frac{433.27 \text{ g}}{6.022 \times 10^{23} \text{ molecules}} = 0.0350 \text{ g Hg}_2\text{S}$$

14. given: 50.4g ZnO need: ? mol

$$50.4 \text{ g ZnO} \times \frac{1 \text{ mol}}{81.38 \text{ g}} = 0.619 \text{ mol ZnO}$$

$$\begin{array}{r} 200.6 \\ 200.6 \\ 32.07 \\ \hline 433.27 \end{array}$$

15. given: 60.0g Ne need: ? L

$$60.0 \text{ g Ne} \times \frac{22.4 \text{ L}}{20.18 \text{ g}} = 66.6 \text{ L Ne}$$

$$\frac{\text{element total}}{\text{compound total}} \times 100 =$$

16. $\begin{array}{l} \text{C} \quad 12.01 \\ \text{H} \quad 6.05 \\ \text{N} \quad 14.01 \\ \hline 31.07 \text{ g/mol} \end{array}$

$(12.01/31.07) \times 100 = 38.65\% \text{ C}$
 $(6.05/31.07) \times 100 = 19.47\% \text{ H}$
 $(14.01/31.07) \times 100 = 44.88\% \text{ N}$

2 decimal places

17. $\begin{array}{l} \text{C}_6 \quad 72.06 \\ \text{H}_6 \quad 6.06 \\ \hline 78.12 \text{ g/mol} \end{array}$

$(72.06/78.12) \times 100 = 92.24\% \text{ C}$
 $(6.06/78.12) \times 100 = 7.76\% \text{ H}$

18. $\begin{array}{l} \text{Ag} \quad 107.9 \\ \text{Cl} \quad 35.45 \\ \hline 143.35 \text{ g/mol} \end{array}$

$(107.9/143.35) \times 100 = 75.27\% \text{ Ag}$
 $(35.45/143.35) \times 100 = 24.73\% \text{ Cl}$

19. $\begin{array}{l} \text{Na} \quad 23.00 \\ \text{O} \quad 16.00 \\ \text{H} \quad 1.00 \\ \hline 40.01 \text{ g/mol} \end{array}$

$(23.00/40.01) \times 100 = 57.49\% \text{ Na}$
 $(16.00/40.01) \times 100 = 39.99\% \text{ O}$
 $(1.01/40.01) \times 100 = 2.52\% \text{ H}$

$$\begin{array}{r}
 20. \text{C}_3 \quad 36.03 \\
 \text{H}_8 \quad \underline{8.08} \\
 \hline
 44.11 \text{ g/mol}
 \end{array}$$

$$\begin{aligned}
 (36.03/44.11) \times 100 &= 81.68\% \text{C} \\
 (8.08/44.11) \times 100 &= 18.32\% \text{H}
 \end{aligned}$$

$$\begin{array}{r}
 21. \text{Cu} \quad 63.55 \\
 \text{S} \quad \underline{32.07} \\
 \text{O}_4 \quad \underline{64.00} \\
 \hline
 159.62 \text{ g/mol}
 \end{array}$$

$$\begin{aligned}
 (63.55/159.62) \times 100 &= 39.81\% \text{Cu} \\
 (32.07/159.62) \times 100 &= 20.09\% \text{S} \\
 (64.00/159.62) \times 100 &= 40.10\% \text{O}
 \end{aligned}$$

$$\begin{array}{r}
 22. \text{C}_2 \quad 24.02 \\
 \text{H}_6 \quad \underline{6.06} \\
 \text{O}_2 \quad \underline{32.00} \\
 \hline
 62.08 \text{ g/mol}
 \end{array}$$

$$\begin{aligned}
 (24.02/62.08) \times 100 &= 38.69\% \text{C} \\
 (6.06/62.08) \times 100 &= 9.76\% \text{H} \\
 (32.00/62.08) \times 100 &= 51.55\% \text{O}
 \end{aligned}$$

$$\begin{array}{r}
 23. \text{C} \quad 12.01 \\
 \text{H} \quad \underline{1.01} \\
 \text{Cl}_3 \quad \underline{106.35} \\
 \hline
 119.37 \text{ g/mol}
 \end{array}$$

$$\begin{aligned}
 (12.01/119.37) \times 100 &= 10.06\% \text{C} \\
 (1.01/119.37) \times 100 &= 0.85\% \text{H} \\
 (106.35/119.37) \times 100 &= 89.09\% \text{Cl}
 \end{aligned}$$

$$\begin{array}{r}
 24. \text{Br}_3 \quad 239.70 \\
 \text{H} \quad \underline{1.01} \\
 \text{Si} \quad \underline{28.09} \\
 \hline
 268.80 \text{ g/mol}
 \end{array}$$

$$\begin{aligned}
 (239.70/268.80) \times 100 &= 89.17\% \text{Br} \\
 (1.01/268.80) \times 100 &= 0.38\% \text{H} \\
 (28.09/268.80) \times 100 &= 10.45\% \text{Si}
 \end{aligned}$$

$$\begin{array}{r}
 25. \text{H} \quad 1.01 \\
 \text{N} \quad \underline{14.01} \\
 \text{O}_3 \quad \underline{48.00} \\
 \hline
 63.02 \text{ g/mol}
 \end{array}$$

$$\begin{aligned}
 (1.01/63.02) \times 100 &= 1.60\% \text{H} \\
 (14.01/63.02) \times 100 &= 22.23\% \text{N} \\
 (48.00/63.02) \times 100 &= 76.17\% \text{O}
 \end{aligned}$$

26. B 27. B 28. B 29. D 30. C

2/27 The Student will be able to:

- calculate % composition
- calculate empirical & molecular formulas.

Empirical & Molecular Formulas

Empirical Formula = the simplest ratio of elements in the compound.

Molecular Formula = the actual element count of a covalent molecule

ex. Emp. Form $C_1H_2O_1$ Molecular Form is a multiple of this formula
for Sugars
empirical mass = 30.03 g/mol
Glucose = $C_6H_{12}O_6$
molecular mass = 180.18 g/mol

STEPS

- ① Divide each percent or mass given by the molecular mass of the element. This creates a ratio.
- ② Divide each ratio by the smallest # in the ratio, this should create whole # ratios. If it does not go to step #3.
- ③ *if needed* if step 2 yields a decimal.

0.8 or more round up

0.3 multiply ALL by 3

0.75 multiply ALL by 4

0.25 " " 4

0.66 " " 3

0.5 " " 2

0.2 or less round off.

88.8% Cu 11.2% O

= Cu_2O

①

63.55

16.00

②

$\frac{1.4}{0.7}$

$\frac{0.7}{0.7}$

2

1

Subscripts

Practice

$$\textcircled{1} \begin{array}{r} 40.0\% \text{ C} \\ 12.01 \end{array} \quad \begin{array}{r} 6.67\% \text{ H} \\ 1.01 \end{array} \quad \begin{array}{r} 53.33\% \text{ O} \\ 16.00 \end{array}$$

$$\begin{array}{r} 3.33 \\ 3.33 \end{array} \quad \begin{array}{r} 6.60 \\ 3.33 \end{array} \quad \begin{array}{r} 3.33 \\ 3.33 \end{array}$$

$$1 \quad 2 \quad 1$$

$$\rightarrow \boxed{\text{C}_2\text{H}_4\text{O}} = 30.03 \text{ g/mol}$$

$$\text{molecular mass} = 150.15 \text{ g/mol}$$

$$\text{molecular formula} = \boxed{\text{C}_5\text{H}_{10}\text{O}_5}$$

$$\textcircled{2} \begin{array}{r} 70.0\% \text{ Fe} \\ 55.85 \end{array} \quad \begin{array}{r} 30.0\% \text{ O} \\ 16.00 \end{array}$$

$$\begin{array}{r} 1.25 \\ 1.25 \end{array} \quad \begin{array}{r} 1.88 \\ 1.25 \end{array}$$

$$1(2) \quad 1.5(2)$$

$$2 \quad 3 \rightarrow \boxed{\text{Fe}_2\text{O}_3}$$

Homework:

① Complete front/back of Lab

② Complete Emp/Mol. Form. Sheet

$$2a. \begin{array}{r} 8.87\text{g P} \\ 30.97 \end{array} \quad \begin{array}{r} 11.43\text{g O} \\ 16.00 \end{array}$$

$$\begin{array}{r} 0.286 \\ 0.286 \end{array} \quad \begin{array}{r} 0.718 \\ 0.286 \end{array}$$

$$1(2) \quad 2.5(2)$$



