

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

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

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 $\text{CaSO}_4 = 136.15 \text{ g/mol}$

$$20.45 \text{ g} \times \frac{1 \text{ mole}}{136.15 \text{ g}} = \boxed{0.1502 \text{ moles } \text{CaSO}_4}$$

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

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

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

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

12. given: 48.0L Cl_2 need: molecules

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

1 mole

6.022×10^{23} atoms
- or -
molecules

22.4 L of a gas

molar mass in grams (Per. Table)

given: _____ need: _____

amt given \times $\frac{\text{needed label}}{\text{given label}}$

11. given: 68.3g H_2S need: ? L m.m. = 34.09g/mol

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

3sf

6. given: 46.6g Na_3PO_3 (need) ? molecules

bottom TOP

molar mass 6.022×10^{23} molecules

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

3sf

$$\frac{xy}{x} = y$$

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

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

15. given: 60.0g Ne need: ? L

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

16. C 12.01
H 6.05
N 14.01

31.07 g/mol

$(12.01/31.07) \times 100 = 38.65\% \text{ C}$
 $(6.05/31.07) \times 100 = 19.48\% \text{ H}$
 $(14.01/31.07) \times 100 = 45.09\% \text{ N}$

17. C 12.06
H 6.06

18.12 g/mol

$(12.06/18.12) \times 100 = 66.56\% \text{ C}$
 $(6.06/18.12) \times 100 = 33.44\% \text{ H}$

18. Ag 107.9
Cl 35.45

143.35 g/mol

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

19. Na 23.00
O 16.00
H 1.01

40.01 g/mol

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3/9

Empirical \neq Molecular Formula
 \uparrow simplest ratio \uparrow actual formula

88.8% Cu 11.2% O

- ① Divide each % by element's molar mass (creates ratio)
- ② Divide each ratio # by the smallest # in the ratio (creates whole #)

* ③ (if needed) if step 2 yields decimals:

.8 or higher round up

.75 multiply all ratios by 4

.66 " " 3

.5 " " 2

.33 " " 3

.25 " " 4

.2 or less round off

$$\frac{88.8\% \text{Cu}}{63.55} \quad \frac{11.2\% \text{O}}{16.00}$$

$$\frac{1.4}{0.7} \quad \frac{0.7}{0.7}$$

2 1
Subscripts

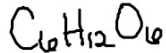
ans Cu₂O

Practice

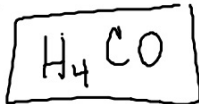
$$\begin{array}{r}
 1. \quad \frac{40.0\% \text{C}}{12.01} \quad \frac{6.67\% \text{H}}{1.01} \quad \frac{53.33\% \text{O}}{16.00} \\
 \hline
 \frac{3.33}{3.33} \quad \frac{6.60}{3.33} \quad \frac{3.33}{3.33} \\
 \hline
 1 \qquad 2 \qquad 1
 \end{array}$$



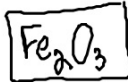
molecular mass = 180.189/mu



$$\begin{array}{r}
 4. \quad \frac{12.6\% \text{H}}{1.01} \quad \frac{37.5\% \text{C}}{12.01} \quad \frac{50.1\% \text{O}}{16.00} \\
 \hline
 \frac{12.48}{3.12} \quad \frac{3.12}{3.12} \quad \frac{3.13}{3.12} \\
 \hline
 4 \qquad 1 \qquad 1
 \end{array}$$



$$\begin{array}{r}
 2. \quad \frac{70.0\% \text{Iron}}{55.85} \quad \frac{30.0\% \text{O}}{16.00} \\
 \hline
 \frac{1.25}{1.25} \quad \frac{1.88}{1.25} \\
 \hline
 1(2) \quad 1.5(2) \\
 2 \qquad 3
 \end{array}$$



$$\begin{array}{r}
 3. \quad \frac{10.1\% \text{C}}{12.01} \quad \frac{0.9\% \text{H}}{1.01} \quad \frac{89.1\% \text{Cl}}{35.45} \\
 \hline
 \frac{0.84}{0.84} \quad \frac{0.89}{0.84} \quad \frac{2.51}{0.84} \\
 \hline
 1 \qquad 1 \qquad 3
 \end{array}$$



Practice Set 2

- | |
|----------------------------|
| 1. K_2SO_4 |
| 2. HgO |
| 3. MgCl_2 |