

# Moles Unit Review Key

$$1) \frac{42\text{g Na} \mid 1\text{mol}}{22.99\text{g}} = 1.8\text{mol}$$

$$2) \frac{2.18\text{mol Cu} \mid 63.55\text{g}}{1\text{mol}} = 139\text{g Cu}$$

$$3) \frac{.28\text{mol Fe} \mid 55.8\text{g}}{1\text{mol}} = 16\text{g Fe}$$

$$4) \frac{7.2\text{mol Cl} \mid 6.02 \times 10^{23}\text{ atoms}}{1\text{mol}} = 4.3 \times 10^{24}\text{ atoms Cl}$$

$$5) \frac{36\text{g Br} \mid 1\text{mol}}{79.90\text{g}} = \frac{.450563264\text{ mol} \mid 6.02 \times 10^{23}\text{ atoms}}{1\text{mol}} = 2.7 \times 10^{23}\text{ atoms Br}$$

$$6) \frac{1.0 \times 10^9\text{ atoms} \mid 1\text{mol}}{6.02 \times 10^{23}\text{ atoms}} = 1.7 \times 10^{-17}\text{ mol}$$

$$7) \frac{1.20 \times 10^{25}\text{ atoms S} \mid 1\text{mol}}{6.02 \times 10^{23}\text{ atoms}} = \frac{.19933548\text{ mol} \mid 32.07\text{g}}{1\text{mol}} = 6.39\text{g S}$$

$$8) \frac{52\text{g CO} \mid 1\text{mol}}{28.01\text{g}} = 1.9\text{mol CO}$$

$$\begin{array}{l} \text{C: } 1 \times 12.01\text{g} = 12.01\text{g} \\ \text{O: } 1 \times 16.00\text{g} = 16.00\text{g} \\ \hline 28.01\text{g} \end{array}$$

$$9) \frac{124\text{g C}_2\text{H}_6 \mid 1\text{mol}}{30.08\text{g}} = 4.12\text{mol C}_2\text{H}_6$$

$$\begin{array}{l} \text{C: } 2 \times 12.01\text{g} = 24.02\text{g} \\ \text{H: } 6 \times 1.01\text{g} = 6.06\text{g} \\ \hline 30.08\text{g} \end{array}$$

$$10) \frac{22.4 \text{ g SnO}_2 \mid 1 \text{ mol}}{150.71 \text{ g}} = \frac{.148629819 \text{ mol} \mid 6.02 \times 10^{23} \text{ f.units}}{1 \text{ mol}} = 8.95 \times 10^{22} \text{ f.units SnO}_2$$

$$\begin{array}{l} \text{Sn: } 1 \times 118.71 \text{ g} = 118.71 \text{ g} \\ \text{O: } 2 \times 16.00 \text{ g} = 32.00 \text{ g} \\ \hline 150.71 \text{ g} \end{array}$$

$$11) \frac{116 \text{ g CCl}_4 \mid 1 \text{ mol}}{153.81 \text{ g}} = \frac{.754177232 \text{ mol} \mid 6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = 4.54 \times 10^{23} \text{ molecules CCl}_4$$

$$\begin{array}{l} \text{C: } 1 \times 12.01 \text{ g} = 12.01 \text{ g} \\ \text{Cl: } 4 \times 35.45 \text{ g} = 141.80 \text{ g} \\ \hline 153.81 \text{ g} \end{array}$$

$$12) \frac{3.01 \times 10^{23} \text{ f.units Fe}_2\text{O}_3 \mid 1 \text{ mol}}{6.02 \times 10^{23} \text{ f.units}} = \frac{0.500 \text{ mol} \mid 159.70 \text{ g}}{1 \text{ mol}} = 79.9 \text{ g Fe}_2\text{O}_3$$

$$\begin{array}{l} \text{Fe: } 2 \times 55.85 \text{ g} = 111.70 \text{ g} \\ \text{O: } 3 \times 16.00 \text{ g} = 48.00 \text{ g} \\ \hline 159.70 \text{ g} \end{array}$$

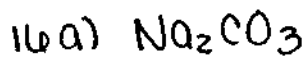
$$13) \frac{1.2 \times 10^{25} \text{ molecules CO} \mid 1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}} = \frac{19.93355482 \text{ mol} \mid 28.01 \text{ g}}{1 \text{ mol}} = 560 \text{ g CO}$$

$$\begin{array}{l} \text{C: } 1 \times 12.01 \text{ g} = 12.01 \text{ g} \\ \text{O: } 1 \times 16.00 \text{ g} = 16.00 \text{ g} \\ \hline 28.01 \text{ g} \end{array}$$

$$14) \frac{1.25 \text{ mol SO}_2 \mid 2 \text{ mol O}}{1 \text{ mol SO}_2} = 2.50 \text{ mol O}$$

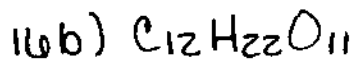
$$15) \frac{1.20 \times 10^{25} \text{ molecules N}_2\text{O}_5 \mid 1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}} = \frac{19.93355482 \text{ mol} \mid 5 \text{ mol O}}{1 \text{ mol N}_2\text{O}_5} = 99.7 \text{ mol O}$$

\* # 14 & 15 will not be tested!



$$\begin{aligned} \text{Na} &: 2 \times 22.99\text{g} = 45.98\text{g} \\ \text{C} &: 1 \times 12.01\text{g} = 12.01\text{g} \\ \text{O} &: 3 \times 16.00\text{g} = \underline{48.00\text{g}} \\ & \qquad \qquad \qquad \underline{105.99\text{g}} \end{aligned}$$

$$\begin{aligned} \% \text{Na} &= \frac{45.98\text{g}}{105.99\text{g}} \times 100 = 43.38\% \text{ Na} \\ \% \text{C} &= \frac{12.01\text{g}}{105.99\text{g}} \times 100 = 11.33\% \text{ C} \\ \% \text{O} &= \frac{48.00\text{g}}{105.99\text{g}} \times 100 = 45.29\% \text{ O} \end{aligned}$$



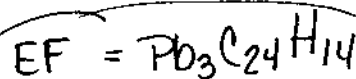
$$\begin{aligned} \text{C} &: 12 \times 12.01\text{g} = 144.12\text{g} \\ \text{H} &: 22 \times 1.01\text{g} = 22.22\text{g} \\ \text{O} &: 11 \times 16.00\text{g} = 176.00\text{g} \\ & \qquad \qquad \qquad \underline{342.34\text{g}} \end{aligned}$$

$$\begin{aligned} \% \text{C} &= \frac{144.12\text{g}}{342.34\text{g}} \times 100 = 42.10\% \text{ C} \\ \% \text{H} &= \frac{22.22\text{g}}{342.34\text{g}} \times 100 = 6.49\% \text{ H} \\ \% \text{O} &= \frac{176.00\text{g}}{342.34\text{g}} \times 100 = 51.41\% \text{ O} \end{aligned}$$

17.)  $\frac{38.43\text{g Pb}}{207.20\text{g}} \times 1\text{mol} = .18547\text{mol Pb} / .18547\text{mol} = (1 \text{ Pb})_3 = \text{Pb}_3$

$\frac{17.83\text{g C}}{12.01\text{g}} \times 1\text{mol} = 1.48460\text{mol C} / .18547\text{mol} = (8 \text{ C})_3 = \text{C}_{24}$

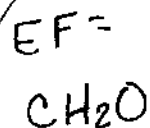
$\frac{3.74\text{g H}}{1.01\text{g}} \times 1\text{mol} = 3.70297\text{mol H} / .18547\text{mol} = (4.7 \text{ H})_3 = \text{H}_{14}$



$$18) \frac{24.39 \text{ g C}}{12.01 \text{ g}} \cdot \frac{1 \text{ mol}}{1 \text{ mol}} = 2.02331 \text{ mol C} / 2.01975 \text{ mol} = 1 \text{ C}$$

$$\frac{4.19 \text{ g H}}{1.01 \text{ g}} \cdot \frac{1 \text{ mol}}{1 \text{ mol}} = 4.05941 \text{ mol H} / 2.01975 \text{ mol} = 2 \text{ H}$$

$$\frac{71.69 \text{ g Cl}}{35.45 \text{ g}} \cdot \frac{1 \text{ mol}}{1 \text{ mol}} = 2.01975 \text{ mol Cl} / 2.01975 \text{ mol} = 1 \text{ Cl}$$



19) E.F. = OCNC

mass (E.F.)

O 1(16.00 g/mol) = 16.00 g/mol

C 1(12.01 g/mol) = 12.01 g/mol

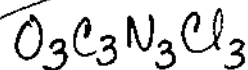
N 1(14.01 g/mol) = 14.01 g/mol

Cl 1(35.45 g/mol) = 35.45 g/mol

77.47 g/mol

M.F. = ?

$$\frac{232.41 \text{ g/mol}}{77.47 \text{ g/mol}} = 3$$



mass (M.F.) = 232.41 g/mol

$$20) \frac{5.9265 \text{ g H}}{1.01 \text{ g}} \cdot \frac{1 \text{ mol}}{1 \text{ mol}} = 5.8678 \text{ mol H} / 5.8678 \text{ mol} = 1 \text{ H}$$

$$\frac{94.0735 \text{ g O}}{16.00 \text{ g}} \cdot \frac{1 \text{ mol}}{1 \text{ mol}} = 5.87959 \text{ mol O} / 5.8678 \text{ mol} = 1 \text{ O}$$

E.F. = HO

mass (E.F.)

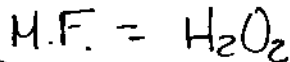
H : 1 x 1.01 g/mol = 1.01 g/mol

O : 1 x 16.00 g/mol = 16.00 g/mol

17.01 g/mol

mass (M.F.) = 34.01468 g/mol

$$\frac{34.01468 \text{ g/mol}}{17.01 \text{ g/mol}} = 2$$



$$21) \frac{1.388 \text{ g C}}{12.01 \text{ g}} \cdot \frac{1 \text{ mol}}{1 \text{ mol}} = .11557 \text{ mol C} / .11557 \text{ mol} = 1 \text{ C}$$

$$\frac{.345 \text{ g H}}{1.01 \text{ g}} \cdot \frac{1 \text{ mol}}{1 \text{ mol}} = .34158 \text{ mol H} / .11557 \text{ mol} = 3 \text{ H}$$

$$\frac{1.850 \text{ g O}}{16.00 \text{ g}} \cdot \frac{1 \text{ mol}}{1 \text{ mol}} = .11563 \text{ mol O} / .11557 \text{ mol} = 1 \text{ O}$$

E.F. = C<sub>3</sub>H<sub>3</sub>O

mass (E.F.)

C 1 x 12.01 g/mol = 12.01 g/mol

H 3 x 1.01 g/mol = 3.03 g/mol

O 1 x 16.00 g/mol = 16.00 g/mol

31.04 g/mol

mass (M.F.) = 62 g/mol

$$\frac{62 \text{ g/mol}}{31.04 \text{ g/mol}} = 2$$

