

Review for mols Test key

- (1) A. $\text{Al}(\text{OH})_3$ - has 3 H's
 B. $\text{H}_2\text{C}_2\text{O}_4$ - has 2 H's

- C. $(\text{NH}_4)_2\text{HPO}_4$ - has 9 H's
 D. $\text{C}_4\text{H}_{10}\text{O}$ - has 10 H's

(2) All three substances contain the same number of molecules because $1.00 \text{ mol} = 6.02 \times 10^{23}$ molecules regardless of the type of compound.

(3) A. H_3PO_4

$$\text{H } 3(1.01 \text{ g}) = 3.03 \text{ g}$$

$$\text{P } 1(30.97 \text{ g}) = 30.97 \text{ g}$$

$$\text{O } 4(16.00 \text{ g}) = 64.00 \text{ g}$$

$$\underline{98.00 \text{ g}}$$

C. $\text{C}_4\text{H}_9\text{O}_2$

$$\text{C } 4(12.01 \text{ g}) = 48.04 \text{ g}$$

$$\text{H } 9(1.01 \text{ g}) = 9.09 \text{ g}$$

$$\text{O } 2(16.00 \text{ g}) = 32.00 \text{ g}$$

$$\underline{89.13 \text{ g}}$$

B. N_2O_3

$$\text{N } 2(14.01 \text{ g}) = 28.02 \text{ g}$$

$$\text{O } 3(16.00 \text{ g}) = 48.00 \text{ g}$$

$$\underline{76.02 \text{ g}}$$

D. $(\text{NH}_4)_2\text{SO}_4$

$$\text{N } 2(14.01 \text{ g}) = 28.02 \text{ g}$$

$$\text{H } 8(1.01 \text{ g}) = 8.08 \text{ g}$$

$$\text{S } 1(32.07 \text{ g}) = 32.07 \text{ g}$$

$$\text{O } 4(16.00 \text{ g}) = 64.00 \text{ g}$$

$$\underline{132.17 \text{ g}}$$

(4) A. $15.5 \text{ g SiO}_2 \left(\frac{1 \text{ mol}}{60.09 \text{ g}} \right) = \underline{.258 \text{ mol SiO}_2}$

B. $0.0688 \text{ g AgCl} \left(\frac{1 \text{ mol}}{143.32 \text{ g}} \right) = \underline{.000480 \text{ mol AgCl}}$
 or $4.80 \times 10^{-3} \text{ mol AgCl}$

(5) A. $0.780 \text{ mol Ca(CN)}_2 \left(\frac{92.12 \text{ g}}{1 \text{ mol}} \right) = \underline{71.9 \text{ g Ca(CN)}_2}$

B. $7.00 \text{ mol H}_2\text{O}_2 \left(\frac{34.02 \text{ g}}{1 \text{ mol}} \right) = \underline{238 \text{ g H}_2\text{O}_2}$

(6) A. $7.6 \text{ mol Ar} \left(\frac{22.4 \text{ L}}{1 \text{ mol}} \right) = \underline{170 \text{ L Ar}}$

B. $0.44 \text{ mol C}_2\text{H}_6 \left(\frac{22.4 \text{ L}}{1 \text{ mol}} \right) = \underline{9.9 \text{ L C}_2\text{H}_6}$

(7) A. $14.4 \text{ L F}_2 \left(\frac{1 \text{ mol}}{22.4 \text{ L}} \right) = 0.643 \text{ mol F}_2$

B. $3.21 \times 10^2 \text{ L CO}_2 \left(\frac{1 \text{ mol}}{22.4 \text{ L}} \right) = 14.3 \text{ mol CO}_2$

(8) A. $3.00 \text{ mol Sn} \left(\frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol}} \right) = 1.81 \times 10^{24} \text{ atoms Sn}$

B. $0.400 \text{ mol KCl} \left(\frac{6.02 \times 10^{23} \text{ f.units}}{1 \text{ mol}} \right) = 2.41 \times 10^{23} \text{ f.units KCl}$

(9) A. $4.80 \times 10^{20} \text{ f.units NaI} \left(\frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ f.units}} \right) = 7.97 \times 10^{-4} \text{ mol NaI}$
or $.000797 \text{ mol NaI}$

B. $7.50 \times 10^{24} \text{ molecules SO}_2 \left(\frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}} \right) = 12.5 \text{ mol SO}_2$

(10) A. $835 \text{ g SO}_3 \left(\frac{1 \text{ mol}}{80.07 \text{ g}} \right) \left(\frac{22.4 \text{ L}}{1 \text{ mol}} \right) = 234 \text{ L SO}_3$

B. $1 \text{ molecule C}_9\text{H}_8\text{O}_4 \left(\frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}} \right) \left(\frac{180.17 \text{ g}}{1 \text{ mol}} \right) = 3 \times 10^{-22} \text{ g C}_9\text{H}_8\text{O}_4$

C. $146 \text{ L O}_3 \left(\frac{1 \text{ mol}}{22.4 \text{ L}} \right) \left(\frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} \right) = 3.92 \times 10^{24} \text{ molecules O}_3$

(11) A. H_2S
 $\text{H } 2(1.01 \text{ g}) = 2.02 \text{ g}$
 $\text{S } 1(32.07 \text{ g}) = 32.07 \text{ g}$
 $\hline 34.09 \text{ g}$

$\% \text{ H} = \frac{2.02 \text{ g}}{34.09 \text{ g}} \times 100 = 5.93\%$

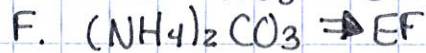
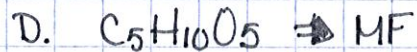
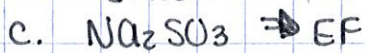
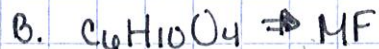
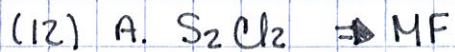
$\% \text{ S} = \frac{32.07 \text{ g}}{34.09 \text{ g}} \times 100 = 94.07\%$

B. Mg(OH)_2
 $\text{Mg } 1(24.31 \text{ g}) = 24.31 \text{ g}$
 $\text{O } 2(16.00 \text{ g}) = 32.00 \text{ g}$
 $\text{H } 2(1.01 \text{ g}) = 2.02 \text{ g}$
 $\hline 58.33 \text{ g}$

$\% \text{ Mg} = \frac{24.31 \text{ g}}{58.33 \text{ g}} \times 100 = 41.68\%$

$\% \text{ O} = \frac{32.00 \text{ g}}{58.33 \text{ g}} \times 100 = 54.86\%$

$\% \text{ H} = \frac{2.02 \text{ g}}{58.33 \text{ g}} \times 100 = 3.46\%$



If it can be simplified, it's a Molecular Formula.
If it is already simplified, it's an Empirical Formula.

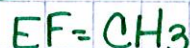
(13) A. $\frac{79.8g C}{12.01g/mol}$ $\frac{20.2g H}{1.01g/mol}$

$= \frac{6.6445 mol C}{6.6445 mol}$

$= 1 C$

$\frac{20.0000 mol H}{6.6445 mol}$

$= 3 H$



B. $\frac{62.1g C}{12.01g/mol}$

$\frac{13.8g H}{1.01g/mol}$

$\frac{24.1g N}{14.01g/mol}$

$= \frac{5.1707 mol C}{5.1707 mol}$

$= (1 C) 3$

$= 3 C$

$= \frac{13.6634 mol H}{5.1707 mol}$

$= (2.6 H) 3$

$= 8 H$

$= \frac{17.2020 mol N}{5.1707 mol}$

$= (3.3 N) 3$

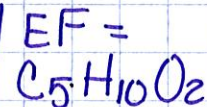
$= 10 N$



(15) $58.5g C / 12.01g/mol = 4.8959 mol C / 1.9625 mol = (2.5 C) 2$

$9.8g H / 1.01g/mol = 9.7030 mol H / 1.9625 mol = (5 H) 2$

$31.4g O / 16.00g/mol = 1.9625 mol O / 1.9625 mol = (1 O) 2$



MMEF

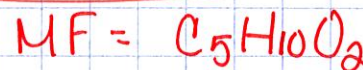
C $5(12.01g) = 60.05g$

H $10(1.01g) = 10.10g$

O $2(16.00g) = 32.00g$

102.15g

$\frac{102}{102} = 1$



(14) A. EF = $\text{C}_3\text{H}_6\text{O}$, 90 g/mol (molecular mass)

MMEF

$$\begin{array}{l} \text{C } 3(12.01\text{g}) = 36.03\text{g} \\ \text{H } 6(1.01\text{g}) = 6.06\text{g} \\ \text{O } 1(16.00\text{g}) = 16.00\text{g} \\ \hline 58.09\text{g} \end{array}$$

$$\frac{90}{30} = 3$$

$$\text{MF} = 3(\text{C}_3\text{H}_6\text{O}) = \boxed{\text{C}_9\text{H}_{18}\text{O}_3}$$

B. $\text{HgCl}_2 = \text{EF}$, molecular mass = 472.2 g/mol

MMEF

$$\begin{array}{l} \text{Hg} = 200.59\text{g} \\ \text{Cl} = 35.45\text{g} \\ \hline 236.04\text{g} \end{array}$$

$$\frac{472.2}{236.04} = 2$$

$$\text{MF} = 2(\text{HgCl}_2) = \boxed{\text{Hg}_2\text{Cl}_4}$$

$$(16) \quad 81.78\text{g C} / 12.01\text{g/mol} = 6.8093\text{mol C} / .7566\text{mol} = 9 \text{ C}$$

$$6.1133\text{g H} / 1.01\text{g/mol} = 6.0528\text{mol H} / .7566\text{mol} = 8 \text{ H}$$

$$12.1056\text{g O} / 16.00\text{g/mol} = .7566\text{mol O} / .7566\text{mol} = 1 \text{ O}$$

EF = $\text{C}_9\text{H}_8\text{O}$

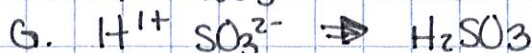
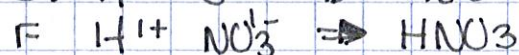
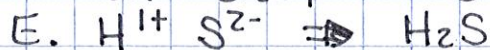
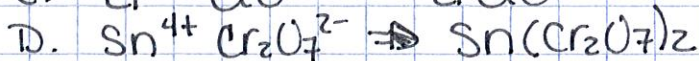
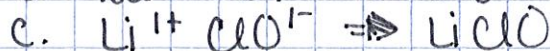
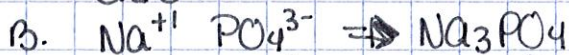
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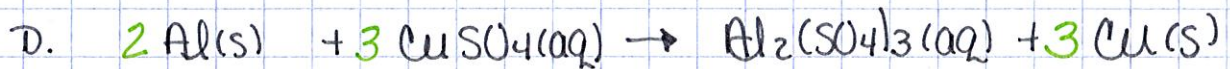
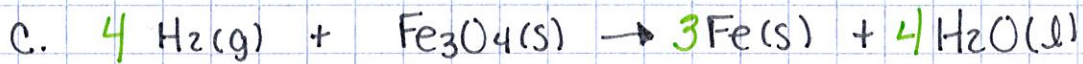
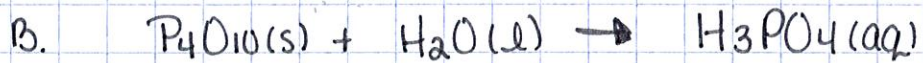
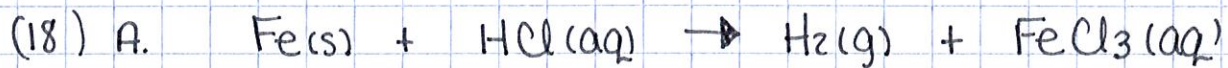
$$\begin{array}{l} \text{C } 9(12.01\text{g}) = 108.09\text{g} \\ \text{H } 8(1.01\text{g}) = 8.08\text{g} \\ \text{O } 1(16.00\text{g}) = 16.00\text{g} \\ \hline 132.17\text{g} \end{array}$$

$$\frac{132}{132} = 1$$

$$\text{MF} = \boxed{\text{C}_9\text{H}_8\text{O}}$$

(17) A. Cl_2O_7





FIVE STAR.
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