

# MORE MIXED MOLE PROBLEMS ANSWER KEY

1 a)

$$\# \text{ atoms} = 5 \text{ m.c. } C_6H_2Cl_4 \times \frac{2 \text{ atoms}}{1 \text{ m.c. } C_6H_2Cl_4} = \boxed{10 \text{ atoms H}}$$

b)

$$\# \text{ atoms} = 10 \text{ m.c. } Co(ClO_4)_2 \cdot 6H_2O \times \frac{12 \text{ atoms H}}{1 \text{ m.c. } Co(ClO_4)_2 \cdot 6H_2O} = \boxed{120 \text{ H atoms}}$$

2 a)

$$\# \text{ m.c. } NH_3 = 50.0 \text{ mL} \times \frac{1 \times 10^{-3} \text{ L}}{1 \text{ mL}} \times \frac{1 \text{ mol } NH_3}{22.4 \text{ L}} \times \frac{6.02 \times 10^{23} \text{ m.c.}}{1 \text{ mol } NH_3} = \boxed{1.34 \times 10^{21} \text{ m.c. } NH_3}$$

b)

$$\# \text{ m.c. } C_{12}H_{22}O_{11} = 75.0 \text{ g} \times \frac{1 \text{ mol}}{342.0 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ m.c.}}{1 \text{ mol}} = \boxed{1.32 \times 10^{23} \text{ m.c. } C_{12}H_{22}O_{11}}$$

$12(12.0) = 144.0$   
 $22(1.0) = 22.0$   
 $11(16.0) = 176.0$   
 $\hline 342.0 \text{ g}$

$$\# \text{ m.c. } Cl_2 = 25.0 \text{ L} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{6.02 \times 10^{23} \text{ m.c. } Cl_2}{1 \text{ mol } Cl_2} = \boxed{6.72 \times 10^{23} \text{ m.c. } Cl_2}$$

d)

$$\# \text{ atoms P} = 125 \text{ mg} \times \frac{1 \times 10^{-3} \text{ g}}{1 \text{ mg}} \times \frac{1 \text{ mol P}}{31.0 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol P}} = \boxed{2.43 \times 10^{21} \text{ atoms P}}$$

3. a)

$$\# L = 10.0 \text{ g H}_2\text{S} \times \frac{1 \text{ mol H}_2\text{S}}{34.1 \text{ g H}_2\text{S}} \times \frac{22.4 \text{ L}}{1 \text{ mol H}_2\text{S}} = \boxed{6.57 \text{ L H}_2\text{S}_{(g)}}$$

b)

$$\# L = 5.0 \times 10^{20} \text{ m.c BrF} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ m.c}} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = \boxed{1.9 \times 10^{-2} \text{ L BrF}}$$

c)

$$\# L = 15.0 \text{ mg SbH}_3 \times \frac{1 \times 10^{-3} \text{ g}}{1 \text{ mg}} \times \frac{1 \text{ mol}}{124.8 \text{ g}} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = \boxed{2.69 \times 10^{-3} \text{ L SbH}_3}$$

d)

$$\# L = 8.5 \times 10^{25} \text{ m.c.} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ m.c.}} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = \boxed{3.2 \times 10^3 \text{ L B}_2\text{H}_6}$$

1 a)

$$1.00 = 1.00 \text{ atom Au} \times \frac{1 \text{ mol Au}}{6.02 \times 10^{23} \text{ atom}} \times \frac{197.0 \text{ g Au}}{1 \text{ mol Au}} = \boxed{3.27 \times 10^{-22} \text{ g Au}}$$

b)

$$\# \text{ g} = 250.0 \text{ mL} \times \frac{1 \times 10^{-3} \text{ L}}{1 \text{ mL}} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{42.0 \text{ g}}{1 \text{ mol}} = \boxed{4.69 \times 10^{-1} \text{ g C}_3\text{H}_6}$$

c)

$$\# \text{ g} = 1.5 \times 10^{15} \text{ m.c} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ m.c.}} \times \frac{143.4 \text{ g}}{1 \text{ mol}} = \boxed{3.6 \times 10^{-7} \text{ g AgCl}}$$

d)

$$\# \text{ g} = 2.00 \text{ L} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{146.1 \text{ g}}{1 \text{ mol}} = \boxed{13.0 \text{ g SF}_6}$$

5 a)

$$\# \text{ mol} = 5.00 \text{ g C}_{10}\text{H}_8 \times \frac{1 \text{ mol}}{128.0 \text{ g}} = \boxed{0.0391 \text{ mol C}_{10}\text{H}_8}$$

$3.91 \times 10^{-2}$

b)

$$\# \text{ mol} = 525 \text{ mg K}_3\text{PO}_4 \times \frac{1 \times 10^3 \text{ g}}{1 \text{ mg}} \times \frac{1 \text{ mol}}{212.3 \text{ g}} = \boxed{2.47 \times 10^{-3} \text{ mol K}_3\text{PO}_4}$$

$0.00247 \text{ mol}$

c)

$$\# \text{ mol} = 6.00 \text{ L} \times \frac{1 \text{ mol}}{22.4 \text{ L}} = \boxed{0.268 \text{ mol NO}_3\text{F}}$$

d)

$$\# \text{ mol} = 1.00 \text{ mL} \times \frac{1 \times 10^{-3} \text{ L}}{1 \text{ mL}} \times \frac{1 \text{ mol}}{22.4 \text{ L}} = \boxed{4.46 \times 10^{-5} \text{ mol O}_3}$$

e)

$$\# \text{ mol} = 4.55 \times 10^{12} \text{ atoms} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ atoms}} = \boxed{7.56 \times 10^{-12} \text{ mol Pt}}$$

f)

$$\# \text{ mol} = 6.02 \times 10^{16} \text{ m.c.} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ m.c.}} = \boxed{1.00 \times 10^{-7} \text{ mol PCl}_5}$$

6 a)

$$\# \text{ L} = 5.75 \times 10^{10} \text{ m.c SbH}_3 \times \frac{1 \text{ mol SbH}_3}{6.02 \times 10^{23} \text{ m.c.}} \times \frac{22.4 \text{ L}}{1 \text{ mol SbH}_3} = \boxed{2.14 \times 10^{-12} \text{ L SbH}_3}$$

b)

$$\# \text{ m.c.} = 75.0 \text{ L O}_3 \times \frac{1 \text{ mol O}_3}{22.4 \text{ L}} \times \frac{6.02 \times 10^{23} \text{ m.c.}}{1 \text{ mol O}_3} = \boxed{2.02 \times 10^{24} \text{ m.c O}_3}$$

c)

$$\# \text{ g} = 2.50 \text{ L} \times \frac{1 \text{ mol}}{22.4 \text{ L}} \times \frac{126.0 \text{ g}}{1 \text{ mol}} = \boxed{14.1 \text{ g PF}_5}$$

d)

$$2 \text{ Al} = 2(27.0) = 54.0$$

$$6 \text{ C} = 6(12.0) = 72.0$$

$$12 \text{ O} = 12(16.0) = 192.0$$

$$8 \text{ H} = 8(1.0) = 8.0$$

$$4 \text{ O} = 4(16.0) = 64.0$$

$$\boxed{390.0 \text{ g Al}_2(\text{C}_2\text{O}_4)_2 \cdot 4\text{H}_2\text{O}}$$

e)

$$\# \text{ mol} = 15.0 \text{ L} \times \frac{1 \text{ mol}}{22.4 \text{ L}} = \boxed{0.670 \text{ mol NH}_3}$$

f)

$$\# \text{ g} = 1 \text{ m.c.} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ m.c.}} \times \frac{132.1 \text{ g}}{1 \text{ mol}} = \boxed{2 \times 10^{-22} \text{ g (NH}_4)_2\text{SO}_4}$$

g)

$$\# \text{ L} = 275 \text{ mg} \times \frac{1 \times 10^{-3} \text{ g}}{1 \text{ mg}} \times \frac{1 \text{ mol}}{76.6 \text{ g}} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = \boxed{8.04 \times 10^{-2} \text{ L GeH}_4}$$