Lecture Practice Problems

$Hg(NH_3)_2Cl_2$ is called diamminemercury(II) chloride.

1. Calculate the percent mercury in $Hg(NH_3)_2Cl_2$.

2. Calculate the grams of chlorine in 80.0 g of $Hg(NH_3)_2Cl_2$.

3. Calculate the number of moles of ammonia, NH_3, in 775. g $Hg(NH_3)_2Cl_2$.

4. Calculate the number of atoms of hydrogen in 4.00×10^{-3} mol $Hg(NH_3)_2Cl_2$.

5. Calculate the mass of $Hg(NH_3)_2Cl_2$ that contains exactly 60.0 g of nitrogen.

6. Calculate the number of molecules of $Hg(NH_3)_2Cl_2$ that contain a total of 1430 atoms.

Lecture Practice Problems

Solutions

1. MW = 200.59 + 14.01×2 + 1.008×6 + 35.45×2 = 305.6

$$\% = \frac{\text{part}}{\text{whole}} \times 100\% = \frac{200.6 \text{ g Hg}}{305.6 \text{ g cmpd}} \times 100\% = 65.65 \text{ \% Hg}$$

2. 80.0 g $Hg(NH_3)_2Cl_2$ = ? g Cl

$$80.0 \text{ g } Hg(NH_3)_2Cl_2 = 80.0 \text{ g cmpd} \times \frac{2 \text{ mol Cl}}{305.6 \text{ g cmpd}} \times \frac{35.45 \text{ g Cl}}{1 \text{ mol Cl}} = 18.6 \text{ g Cl}$$

3. 775. g $Hg(NH_3)_2Cl_2$ = ? mol NH_3

$$775. \text{ g } Hg(NH_3)_2Cl_2 = 775. \text{ g cmpd} \times \frac{2 \text{ mol } NH_3}{305.6 \text{ g cmpd}} = 5.07 \text{ mol } NH_3$$

4. 4.00×10^{-3} mol $Hg(NH_3)_2Cl_2$ = ? atoms H

$$4.00 \times 10^{-3} \text{ mol } Hg(NH_3)_2Cl_2 = 4.00 \times 10^{-3} \text{ mol cmpd} \times \frac{6 \text{ mol H}}{1 \text{ mol cmpd}} \times \frac{6.022 \times 10^{23} \text{ atoms H}}{1 \text{ mol H}}$$

$$= 1.45 \times 10^{22} \text{ atoms H}$$

5. 60.0 g N = ? g $Hg(NH_3)_2Cl_2$

$$60.0 \text{ g N} = 60.0 \text{ g N} \times \frac{305.6 \text{ g cmpd}}{28.02 \text{ g N}} = 654. \text{ g } Hg(NH_3)_2Cl_2$$

6. 1430 atoms = 1430 atoms $\times \frac{1 \text{ molecule}}{11 \text{ atoms}}$ = 130 molecules $Hg(NH_3)_2Cl_2$

1430 atoms = ? molecules $Hg(NH_3)_2Cl_2$