1. $M = \frac{\text{moles}}{\text{Liters}} = \frac{6.73\text{g } Na_2CO_3}{250.\text{mL}} \times \frac{1000\text{mL}}{1\text{L}} \times \frac{1\text{mol } Na_2CO_3}{105.99\text{g}}$

$= 0.253986\ M$

$= \boxed{0.254\ M\ Na_2CO_3}$

2. $250.\text{mL} \times \frac{1\text{L}}{1000\text{mL}} \times \frac{0.0125\text{mol}}{1\text{L}}\ (M) \times \frac{158.04\text{g } KMnO_4}{1\text{mol } KMnO_4} = \boxed{0.494\text{g } KMnO_4}$

3. $25.0\text{g NaOH} \times \frac{1\text{mol NaOH}}{40.0\text{g}} \times \frac{1\text{L}}{0.123\text{mol}}\ (M^{-1}) \times \frac{1000\text{mL}}{1\text{L}} = \boxed{5080\text{mL}}$

~~5.00×10^3 mL~~

4. $m_1V_1 = m_2V_2$

$(0.0250\ M)(4.00\text{mL}) = X\ (10.00\text{mL})$

$X = \boxed{0.0100\ M}$

5. a) $[NH_4^+] = 2 \times 0.25M = \boxed{0.50M}$

* $[SO_4^{2-}] = \boxed{0.25M}$

b) $[H^+] = \boxed{0.056\ M}$

$[NO_3^-] = \boxed{0.056\ M}$

c) $[Na^+] = 2 \times 0.123M = \boxed{0.246M}$

$[CO_3^{2-}] = \boxed{0.123M}$

d) $[K^+] = \boxed{0.00124\ M}$

$[ClO_4^-] = \boxed{0.00124\ M}$

6. $1.30\,g\ Ba(OH)_2 \times \frac{1\,mol\ Ba(OH)_2}{171.32\,g} \times \frac{2\,mol\ HNO_3}{1\,mol\ Ba(OH)_2} \times \frac{1000\,mL}{0.125\,mol\ HNO_3} = 121\,mL\ HNO_3$ (M^{-1})

7. $0.250\,g\ AgBr \times \frac{1\,mol\ AgBr}{187.8\,g} \times \frac{2\,mol\ Na_2S_2O_3}{1\,mol\ AgBr} \times \frac{1000\,mL}{0.0138\,mol} = 193\,mL$ (M^{-1})

8. $1.33\,g\ NaOH \times \frac{1\,mol\ NaOH}{40.0\,g} \times \frac{1\,mol\ HCl}{1\,mol\ NaOH} \times \frac{1000\,mL\ HCl}{0.812\,mol\ HCl} = 40.9\,mL$ (M^{-1})

9. $2.152\,g\ Na_2CO_3 \times \frac{1\,mol\ Na_2CO_3}{105.99\,g} \times \frac{2\,mol\ HCl}{1\,mol\ Na_2CO_3} \times \frac{1000\,mL}{0.955\,mol\ HCl} = 42.52\,mL\ HCl$ (M^{-1})

91. $32.0\ \text{g}\ C_{12}H_{22}O_{11} \times \dfrac{1\ \text{mol}\ C_{12}H_{22}O_{11}}{342.30\ \text{g}} = 0.0935\ \text{mol}\ C_{12}H_{22}O_{11}$ added to blood

The blood sugar level would increase by:

$$\frac{0.0935\ \text{mol}\ C_{12}H_{22}O_{11}}{5.0\ \text{L}} = 0.019\ \text{mol/L}$$

92. $\text{Mol}\ CaCl_2\ \text{present} = 0.230\ \text{L}\ CaCl_2 \times \dfrac{0.275\ \text{mol}\ CaCl_2}{\text{L}\ CaCl_2} = 6.33 \times 10^{-2}\ \text{mol}\ CaCl_2$

The volume of $CaCl_2$ solution after evaporation is:

$$6.33 \times 10^{-2}\ \text{mol}\ CaCl_2 \times \frac{1\ \text{L}\ CaCl_2}{1.10\ \text{mol}\ CaCl_2} = 5.75 \times 10^{-2}\ \text{L} = 57.5\ \text{mL}\ CaCl_2$$

Volume H_2O evaporated = 230. mL − 57.5 mL = 173 mL H_2O evaporated

93. There are other possible correct choices for most of the following answers. We have listed

121. a. $5.0 \text{ ppb Hg in water} = \dfrac{5.0 \text{ ng Hg}}{\text{g soln}} = \dfrac{5.0 \times 10^{-9} \text{ g Hg}}{\text{mL soln}}$

$$\frac{5.0 \times 10^{-9} \text{ g Hg}}{\text{mL}} \times \frac{1 \text{ mol Hg}}{200.6 \text{ g Hg}} \times \frac{1000 \text{ mL}}{\text{L}} = 2.5 \times 10^{-8} M \text{ Hg}$$

b. $$\frac{1.0 \times 10^{-9} \text{ g } CHCl_3}{\text{mL}} \times \frac{1 \text{ mol } CHCl_3}{119.37 \text{ g } CHCl_3} \times \frac{1000 \text{ mL}}{\text{L}} = 8.4 \times 10^{-9} M \ CHCl_3$$

c. $10.0 \text{ ppm As} = \dfrac{10.0 \text{ µg As}}{\text{g soln}} = \dfrac{10.0 \times 10^{-6} \text{ g As}}{\text{mL soln}}$

$$\frac{10.0 \times 10^{-6} \text{ g As}}{\text{mL}} \times \frac{1 \text{ mol As}}{74.92 \text{ g As}} \times \frac{1000 \text{ mL}}{\text{L}} = 1.33 \times 10^{-4} M \text{ As}$$

d. $$\frac{0.10 \times 10^{-6} \text{ g DDT}}{\text{mL}} \times \frac{1 \text{ mol DDT}}{354.46 \text{ g DDT}} \times \frac{1000 \text{ mL}}{\text{L}} = 2.8 \times 10^{-7} M \text{ DDT}$$

122. We want 100.0 mL of each standard. To make the 100. ppm standard:

$$\frac{100. \text{ µg Cu}}{\text{mL}} \times 100.0 \text{ mL solution} = 1.00 \times 10^4 \text{ µg Cu needed}$$

$$1.00 \times 10^4 \text{ µg Cu} \times \frac{1 \text{ mL stock}}{1000.0 \text{ µg Cu}} = 10.0 \text{ mL of stock solution}$$

Therefore, to make 100.0 mL of 100. ppm solution, transfer 10.0 mL of the 1000.0 ppm stock solution to a 100-mL volumetric flask, and dilute to the mark.

Similarly:

75.0 ppm standard, dilute 7.50 mL of the 1000.0 ppm stock to 100.0 mL.

50.0 ppm standard, dilute 5.00 mL of the 1000.0 ppm stock to 100.0 mL.

25.0 ppm standard, dilute 2.50 mL of the 1000.0 ppm stock to 100.0 mL.

10.0 ppm standard, dilute 1.00 mL of the 1000.0 ppm stock to 100.0 mL.