

$$M = \frac{\text{mol}}{L}$$

Name Key

Date _____

Chemistry 11

1. Calculate the mass of potassium carbonate (K_2CO_3) needed to make 400.0 mL of a 0.200 M solution of K_2CO_3 . Include proper units in your work and in your answers. (2 marks)

$$\text{mol} = M \times L$$

$$= 0.200 M \times 0.4000 L$$

$$= 0.0800 \text{ mol}$$

$$\begin{aligned} \#g &= 0.0800 \text{ mol } K_2CO_3 \times \frac{138.2 \text{ g}}{\text{mol}} \\ &= 11.1 \text{ g } K_2CO_3 \end{aligned}$$

Answer

$$\boxed{11.1 \text{ g } K_2CO_3}$$

2. What volume of 2.50 M Li_2SO_3 would need to be evaporated in order to obtain 422.55 g of solid Li_2SO_3 ? Include proper units in your work and in your answers. (2 marks)

$$422.55 \text{ g } Li_2SO_3 \times \frac{1 \text{ mol}}{93.9 \text{ g}} = 4.50 \text{ mol } Li_2SO_3$$

$$\begin{aligned} L &= \frac{\text{mol}}{M} = \frac{4.50 \text{ mol}}{2.50 M} \\ &= 1.8 L \end{aligned}$$

Answer

$$\boxed{1.80 L}$$

3. 150.0 mL of water are added to 200.0 mL of 0.60 M HNO_3 . Calculate the final $[HNO_3]$. Include proper units in your work and in your answers. (2 marks)

$$C_1 V_1 = C_2 V_2$$

$$0.60 M (200.0) = C_2 (350.0)$$

$$C_2 = 0.34 M$$

Answer

$$\boxed{0.34 M}$$

4. What volume of water needs to be added to 50.0 mL of 6.00 M H_2SO_4 in order to bring the concentration down to 2.50 M? Include proper units in your work and in your answers. (2 marks)

$$C_1 V_1 = C_2 V_2$$

$$(6.00)(50.0) = (2.50) V_2$$

$$V_2 = 120$$

$$120.0 - 50.0$$

$$= \boxed{70.0 \text{ mL}}$$

5. What volume of 12.0 M HCl must be used in order to produce 500.0 mL of 0.250 M HCl? Include proper units in your work and in your answers. (2 marks)

$$C_1V_1 = C_2V_2$$

$$(12.0)(V_1) = (0.250)(500.0)$$

$$V_1 = 10.4 \text{ mL}$$

Answer

$$\boxed{10.4 \text{ mL}}$$

6. 200.0 mL of 0.450 M NaOH is diluted to a total volume of 1.00 L. Calculate the final concentration of NaOH. Include proper units in your work and in your answers. (2 marks)

$$C_1V_1 = C_2V_2$$

$$(0.450)(200.0) = C_2(1000.0)$$

$$\boxed{C_2 = .0900 \text{ M}}$$

Answer

7. Give directions on how to make 400.0 mL of 0.020 M KMnO_4 using solid KMnO_4 and water. Include proper units in your work and in your answers. (2 marks)

$$\text{mol} = M \times L$$

$$= 0.02 \text{ M} \times 0.4000 \text{ L} = \underline{0.00800 \text{ mol}}$$

$$\#g = 0.00800 \text{ mol } \text{KMnO}_4 \times \frac{158.0 \text{ g}}{1 \text{ mol}} = 1.26 \text{ g } \text{KMnO}_4$$

* Add 1.26 g KMnO_4 to less than 400.0 mL of water. Dissolve and add water to dilute to 400.0 mL.