

**9.46:** Describe how you would prepare 250 mL of a 0.10 M NaCl solution?

- take 0.10g of NaCl and dissolve it into 250 mL of water

**9.50:** How many moles of each substance are needed to prepare the following solutions?

a) 50.0 mL of 8.0% (m/v) KCl (MW = 74.55 g/mol)  $KCl = 74.55 \text{ g}$

$$\frac{(50.0 \text{ mL})(8.0\%)}{100} = 4.0 \text{ g } KCl \times \frac{1 \text{ mol } KCl}{74.55 \text{ g } KCl} = 0.054 \text{ mol }$$

b) 200.0 mL of 7.5% (m/v) acetic acid (MW = 60.0228 g/mol)

$$\frac{(200.0 \text{ mL})(7.5\%)}{100} = 15 \text{ g acetic acid} \times \frac{1 \text{ mol acetic acid}}{60.0228 \text{ g acetic acid}} = 0.25 \text{ mol acetic acid}$$

**9.56:** How many grams of solute are in the following solutions?

a) 200 mL of 0.30 M acetic acid,  $CH_3COOH \Rightarrow 60.0228 \text{ g}$

$$200 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} = .2 \text{ L} \quad \frac{0.30 \text{ mol}}{1 \text{ L}} \times .2 \text{ L} = .06 \text{ mol} \times \frac{60.0228 \text{ g}}{1 \text{ mol}}$$



$$3.6 \text{ g } CH_3COOH$$

b) 1.50 L of 0.25 M NaOH  $\rightarrow 39.99016 \text{ g}$

$$1.50 \text{ L} \times \frac{0.25 \text{ mol}}{1 \text{ L}} = .375 \text{ mol} \times \frac{39.99 \text{ g}}{1 \text{ mol}} = 15 \text{ g NaOH}$$

**9.58:** Nalorphine, a relative of morphine, is used to combat withdrawal symptoms in heroine users. How many milliliters of a 0.40% (m/v) solution of nalorphine must be injected to obtain a dose of 1.5 mg?  $1.5 \text{ mg} \times \frac{1 \text{ g}}{1000 \text{ mg}} = .0015 \text{ g}$

$$\frac{(.? \text{ mL})(.40\%) }{100} = .0015 \text{ g} \Rightarrow .0015 \text{ g} \times \frac{100}{.40} = (.? \text{ mL}) \frac{(.40\%)}{.40} = .38 \text{ mL}$$

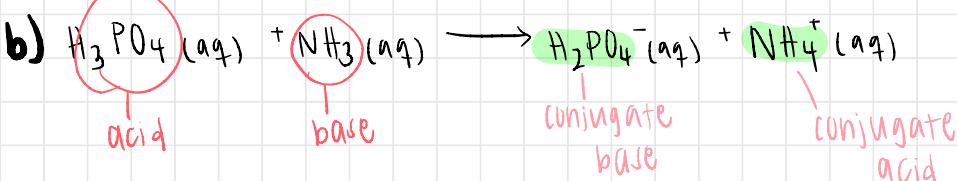
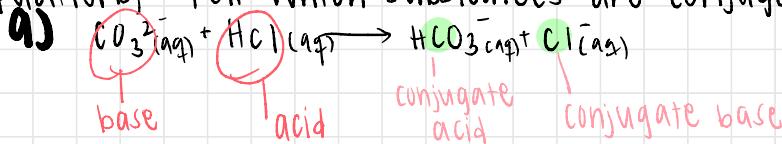
**9.65:** Concentrated (12.0M) hydrochloric acid is sold for household and industrial purposes under the name "muriatic acid". How many milliliters of 0.500M HCl solution can be made from 25.0 mL of 12.0 M HCl solution.

$$(12.0)(25.0) = (0.500)(V_d) \Rightarrow \frac{300}{0.500} = \frac{(0.500)(V_d)}{0.500} = 600. \text{ mL}$$

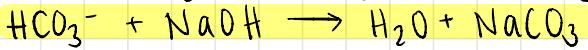
**9.89:** A typical dosage of statin drugs for the treatment of high cholesterol is 10mg. Assuming a total blood volume of 5.0L, calculate the (m/v)% concentration of drug in the blood units of g/(100mL).

$$10 \text{ mg} \times \frac{1 \text{ g}}{1000 \text{ mg}} = .01 \text{ g} \Rightarrow \frac{.01 \text{ g}}{5.0 \text{ L}} \times 100 = .20\% \text{ (m/v)}$$

**10.47:** Label the Brønsted-Lowry acids + bases in the following equations, + tell which substances are conjugate acid-base pairs.



**10.67:** Write equations for  $\text{HCO}_3^-$  and  $\text{H}_2\text{PO}_4^-$  acting as bases with the strong acid HCl and as acids with the strong base NaOH.



**10.69:**  $\text{NaHCO}_3$  = common home remedy for acid indigestion + is also used to neutralize acid spills in the lab. Write a balanced equation for the reaction with:



**10.80:** What is the pH of a buffer system that contains 0.15 M  $\text{NH}_4^+$  and 0.10 M  $\text{NH}_3$ ? The  $\text{pK}_a$  of  $\text{NH}_4^+$  = 9.25

$$\text{pH} = \text{pK}_a + \log \frac{[\text{base}]}{[\text{acid}]}$$

$$\text{pK}_a + \text{pK}_b = 14$$

$$[\text{NH}_3] = 0.10\text{M}; [\text{NH}_4^+] = 0.15\text{M}$$

$$\text{pH} = 9.25 + \log \frac{[0.10]}{[0.15]}$$

$$\boxed{\text{pH} = 9.07}$$