CHM151 Quiz 3a 25 Pts Spring 2008 Name:_____ Key _____

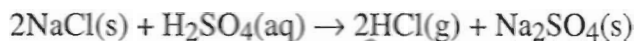*****Show all work to receive credit****
H 1.008; N 14.01; O 16.00; Cl 35.45; Na 22.99; S 32.07; K 39.01;

1.(8 Pts) Hydrochloric acid can be prepared by the following reaction:

$$2NaCl(s) + H_2SO_4(aq) \rightarrow 2HCl(g) + Na_2SO_4(s)$$

500.0 mL

6.00 mol

? g

How many grams of HCl can be prepared from 500.0 mL of 6.00 M H_2SO_4?

$$\frac{500.0 \, mL \, H_2SO_4}{} \left| \frac{6.00 \, mol \, H_2SO_4}{1000 \, mL \, H_2SO_4} \right| \frac{2 \, mol \, HCl}{1 \, mol \, H_2SO_4} \left| \frac{36.46 g \, HCl}{mol \, HCl} \right. = 218.7 \, g \, HCl$$

$\boxed{219}$ ↗

2. (5 Pts) What volume of concentrated nitric acid (15.0 M) is required to make 250 mL of a 3.0 M nitric acid solution?

$$M_1 V_1 = M_2 V_2$$

$$(15.0 M)(V_1) = (3.0 M)(250 mL)$$

$$V_1 = 50 \, mL$$

3. (5 Pts) If 115 grams of potassium nitrate(KNO_3) were added to water to make 1,500 mL of solution, what would be the molarity of the resulting solution?

$$\frac{☺}{1,500 \times 10^{-3} L} \left| \frac{115 g \, KNO_3}{☺} \right| \frac{mol}{101.02 g} = 0.759 \, \frac{mol}{L}$$

$\boxed{0.76}$ ↗

4. (7 Pts) A 50.0 mL sample of sodium hydroxide was titrated with 2.95 M H_2SO_4. If it took 28.75 mL of the sulfuric acid solution to neutralize the NaOH solution, what was the molarity of the NaOH solution?

$$2NaOH(aq) + H_2SO_4(aq) \rightarrow 2H_2O(l) + Na_2SO_4(aq)$$

50.0 mL   2.95 mol
                    L
? mol   28.75 mL
 L
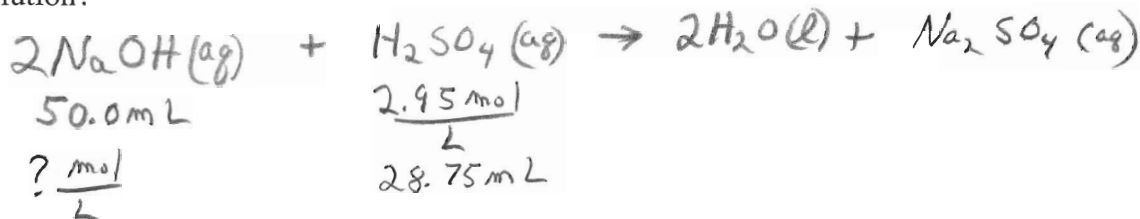
$$\frac{☺}{50.0 \times 10^{-3} L \, NaOH} \left| \frac{28.75 \, mL \, H_2SO_4}{☺} \right| \frac{2.95 \, mol \, H_2SO_4}{1000 mL \, H_2SO_4} \left| \frac{2 \, mol \, NaOH}{1 \, mol \, H_2SO_4} \right. = 3.393 \frac{mol \, NaOH}{L \, NaOH}$$

$\boxed{3.39}$ ↗

H 1.008; N 14.01; O 16.00; Cl 35.45; Na 22.99; S 32.07; K 39.01;

1. (7 Pts) A 50.0 mL sample of sodium hydroxide was titrated with 2.95 M H_2SO_4. If it took 28.75 mL of the sulfuric acid solution to neutralize the NaOH solution, what was the molarity of the NaOH solution?

$$3.39 \frac{mol\ NaOH}{L_{NaOH}}$$

2. (5 Pts) What volume of concentrated nitric acid (15.0 M) is required to make 350 mL of a 4.0 M nitric acid solution?

$$M_1 V_1 = M_2 V_2$$
$$(15.0 M)(V_1) = (4.0 M)(350 mL)$$
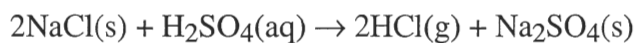$$V_1 = 93.3\ mL \quad \boxed{93}$$

3. (5 Pts) If 115 grams of sodium nitrate(NaNO_3) were added to water to make 1,500 mL of solution, what would be the molarity of the resulting solution?

$$\frac{115\,g\ NaNO_3}{} \left| \frac{mol}{85.0\,g} \right| \frac{}{1.5\ L} = 0.902 \frac{mol}{L} \quad \boxed{0.90} \frac{mol}{L}$$

4. (8 Pts) Hydrochloric acid can be prepared by the following reaction:

$$2NaCl(s) + H_2SO_4(aq) \rightarrow 2HCl(g) + Na_2SO_4(s)$$

How many grams of HCl can be prepared from 500.0 mL of 6.00 M H_2SO_4?

$$219\,g$$