Name: Key

Spring Semester Review (as of 4/27)

Lab Practical Review

1. A process by which zirconium metal can be produced from the mineral zirconium(IV) orthosilicate, $ZrSiO_4$,starts by reacting it with chlorine gas to form zirconium(IV) chloride.
$ZrSiO_4 + 2Cl_2 \rightarrow ZrCl_4 + SiO_2 + O_2$

What is the theoretical yield of $ZrCl_4$ can be produced if 862 g of $ZrSiO_4$ and 950. g of Cl_2 are available?

	H	N	
$ZrSiO_4$	862g	1227.75g	
Cl_2	950g	667g	

$862g \times \frac{1mol}{183g} \times \frac{2mol\,Cl_2}{1mol\,ZrSiO_4} \times \frac{70.8g}{1mol} = 667g$

$950g \times \frac{1mol}{70.8g} \times \frac{1mol\,ZrSiO_4}{2mol\,Cl_2} \times \frac{183g}{1mol} = 1227.75g$

What is the limiting reactant?

$ZrSiO_4$ $862g \times \frac{1mol}{183g} \times \frac{1mol}{1mol} \times \frac{232.8g}{1mol} =$ **1096.6 g $ZrCl_4$**

2. Jenny has 32g of potassium chloride and wants to add it to water to make an aqueous solution with a concentration of 0.55M. What should be the total volume of the solution she wants to make?

$32g\,KCl \times \frac{1mol}{74.4g} \times \frac{1L}{.55mol} \times \frac{1000mL}{1L} =$ **782mL**

Predict the products and balance the equations. Classify each reaction.

3. magnesium bromide + chlorine reacts

$MgBr_2 + Cl_2 \rightarrow MgCl_2 + Br_2$

Type: Single Displacement

4. $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

Type: Combustion

5. zinc nitrate + potassium iodide reacts

$Zn(NO_3)_2 + 2KI \rightarrow ZnI_2 + 2KNO_3$

Type: Double Displacement

6. What volume of 1.32 M NaI solution is needed to fully react with 9.08 L of chlorine gas measured at 76.3°C and 6.87 kPa?

$\underline{2}\ NaI + \underline{\ }\ Cl_2 \rightarrow \underline{2}\ NaCl + \underline{\ }\ I_2$

$6.87\,kPa \times \frac{1\,atm}{101.3\,kPa} = .0678\,atm$

$PV = nRT$

$.0678\,atm \cdot 9.08\,L = n \cdot .0821 \cdot 349.3$

$n = .0247\,mol \times \frac{2\,mol\,NaI}{1\,mol\,Cl_2} \times \frac{1\,L}{1.32\,mol} \times \frac{1000\,mL}{1\,L} = 52.55\,mL$

7. Calculate the molarity of an acetic acid solution if 34.57 mL of this solution are needed to neutralize 25.19 mL of 0.1025 M sodium hydroxide.

acetic acid

$CH_3COOH\,(aq) + NaOH\,(aq) \rightarrow Na^+(aq) + CH_3COO^-(aq) + H_2O\,(l)$

$25.19\,mL \times \frac{1\,L}{1000\,mL} \times \frac{.1025\,mol\,NaOH}{1\,L} \times \frac{1\,mol}{1\,mol} = .00258\,mol\,HC_2H_3O_2$

$\frac{.00258\,mol\,HC_2H_3O_2}{.03457\,L} = .0746\,M$

8. Given the following reaction, how will the following changes shift the system?

$3\,H_2(g) + N_2(g) \leftrightarrow 2\,NH_3(g)$

a. Extra NH_3 is added

shift to reactant

b. N_2 is removed from the system

shift to reactant

c. H_2 is added

shift to products

d. The pressure is increased

shift to products

The lab practical is not limited to only these questions above. Many questions will require you to perform procedures in the lab with accuracy and precision. Any content from this semester is fair game.

Spring Semester:

Chemical Reactions	***Gas Laws***	***Acids and Bases***
Stoichiometry	***Solutions***	***Equilibrium***