

1A Exam 2 Spring 2014 50pts

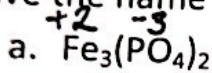
Hagerman

(end Chapter 2, Chapter 3, Chapter 4 with no redox/dilutions)

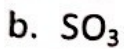
All work & calculations must be shown – all units & names must be shown in your work. (No work = no credit) Be neat & clear. Take your time and good luck!

$$1 \text{ mol} = 6.022 \times 10^{23} \text{ "things"}$$

1. Give the name of the following compounds – proper spelling is required! 6pts



iron (II) phosphate



sulfur trioxide



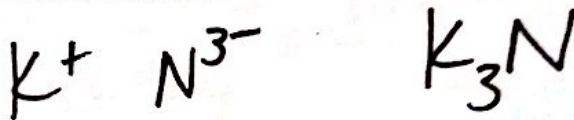
nitrous acid

2. Give the balanced chemical formula for the following compounds. 6pts

a. Copper (II) oxide



b. Potassium nitride



c. Hydrosulfuric acid



3. Calculate the number of oxygen atoms in 5.93 grams of  $\text{Cr}(\text{PO}_4)_2$ . ( $\text{Cr}(\text{PO}_4)_2 = 241.94\text{g/mol}$ ) 4pts

$$5.93 \text{ g Cr}(\text{PO}_4)_2 \times \frac{1 \text{ mol Cr}(\text{PO}_4)_2}{241.94 \text{ g}} \times \frac{8 \text{ mol O}}{1 \text{ mol}} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol O}}$$

$$= 1.18 \times 10^{23} \text{ atoms}$$

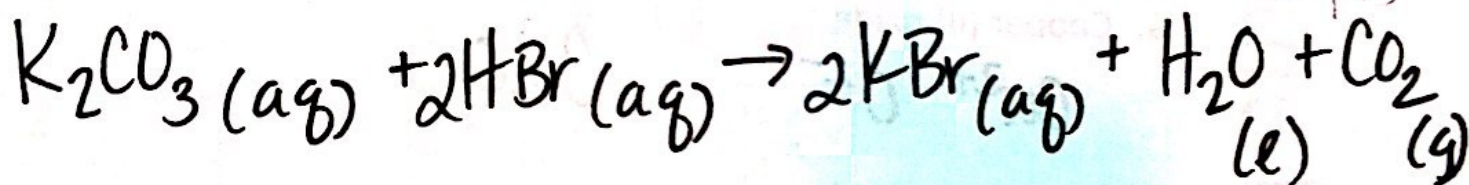
4. Calculate the grams of sulfur hexafluoride in  $4.67 \times 10^{28}$  molecules of sulfur hexafluoride. (S = 32.1 g/mol, F = 19.0g/mol) 4 pts

$$4.67 \times 10^{28} \text{ molecules SF}_6 \times \frac{1 \text{ mol SF}_6}{6.022 \times 10^{23} \text{ molecules}} \times \frac{146.1 \text{ g}}{\text{mol}} =$$

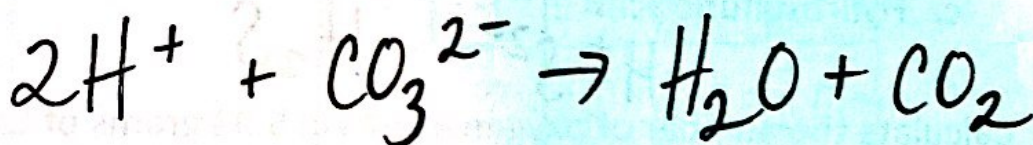
$1.13 \times 10^7 \text{ g}$

5. Complete the following for the reaction between an aqueous potassium carbonate solution and hydrobromic acid. Any potassium containing product is aqueous. You should know what to do with everything else! All phases must be shown in the molecular equation.

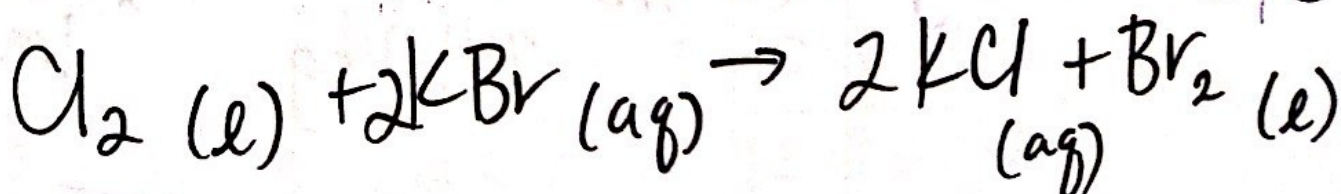
a. Balanced Molecular Equation



b. Balanced Net Ionic Equation



6. Write the balanced single replacement reaction when liquid chlorine reacts with aqueous potassium bromide. Assume a reaction occurs.





7. A 50.6 g sample of  $\text{Mg}(\text{OH})_2$  is reacted with 45.0 g of  $\text{HCl}$  according to the reaction:  $\text{Mg}(\text{OH})_2 + 2 \text{HCl} \rightarrow \text{MgCl}_2 + 2 \text{H}_2\text{O}$ .

( $\text{Mg}(\text{OH})_2 = 58.3197 \text{ g/mol}$ ,  $\text{HCl} = 36.46 \text{ g/mol}$ ,  $\text{H}_2\text{O} = 18.0 \text{ g/mol}$ )

a. Calculate the theoretical yield of water produced. (a calculation must be shown for each reactant)

$$50.6 \text{ g } \text{Mg}(\text{OH})_2 \underset{\text{excess}}{\times} \frac{1 \text{ mol } \text{Mg}(\text{OH})_2}{58.3197 \text{ g}} \times \frac{2 \text{ mol } \text{H}_2\text{O}}{1 \text{ mol } \text{Mg}(\text{OH})_2} \times \frac{18.0 \text{ g}}{\text{mol}} = 31.23 \text{ g } \text{H}_2\text{O}$$

6 pts

$$45.0 \text{ g } \text{HCl} \underset{\text{LR}}{\times} \frac{1 \text{ mol } \text{HCl}}{36.46 \text{ g}} \times \frac{2 \text{ mol } \text{H}_2\text{O}}{2 \text{ mol } \text{HCl}} \times \frac{18.0 \text{ g}}{\text{mol}} = \boxed{\begin{array}{l} \text{T. YIELD} \\ 22.22 \text{ g} \\ \text{H}_2\text{O} \end{array}}$$

b. Who is the limiting reactant?

$\boxed{\text{HCl}}$

2 pts

c. Calculate the mass of excess reactant USED.

$$45.0 \text{ g } \text{HCl} \times \frac{1 \text{ mol } \text{HCl}}{36.46 \text{ g}} \times \frac{1 \text{ mol } \text{Mg}(\text{OH})_2}{2 \text{ mol } \text{HCl}} \times \frac{58.3197 \text{ g}}{\text{mol}} = \boxed{35.89 \text{ g}}$$

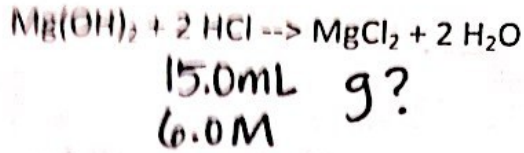
2 pts

d. Calculate the mass of excess reactant LEFTOVER.

$$50.6 \text{ g} - 35.89 \text{ g} = \boxed{14.71 \text{ g}}$$

2 pts

8. Calculate the mass in grams of magnesium chloride (95.2g/mol) produced from the reaction of 15.0mL of a 6.0M HCl solution with excess magnesium hydroxide, given:



5 pts

$$0.0150 \text{ L} \times \frac{6 \text{ mol HCl}}{\text{L}} \times \frac{1 \text{ mol MgCl}_2}{2 \text{ mol HCl}} \times \frac{95.2 \text{ g}}{\text{mol}} = \boxed{4.284 \text{ g}}$$

9. Determine the empirical formula given the following: 0.89 grams of potassium, 1.18 grams of chromium, and 1.27 grams of oxygen.

5 pts

$$0.89 \text{ g K} \times \frac{\text{mol}}{39.0983 \text{ g}} = 0.02276314 \text{ mol}$$

$$1.18 \text{ g Cr} \times \frac{\text{mol}}{51.9961 \text{ g}} = 0.02269401 \text{ mol}$$

$$1.27 \text{ g O} \times \frac{\text{mol}}{15.9994 \text{ g}} = 0.07937798 \text{ mol}$$

x 2

