In addition, any of the material from this week will also be on the midterm (calculating molarity, making solutions using molarity, titration and naming molecular compounds)

1. 0.145 g of aluminum metal reacts with 10.0 mL of 1.5 M hydrobromic acid, as shown below

Aluminum bromide + hydrogen gas

$$\underline{2}\ Al + \underline{6}\ HBr \rightarrow 2AlBr_3 + 3H_2$$

a. Determine if the reaction happens. If it does, write the formulas and names of the products and balance the equation.
b. What kind of reaction is this? Single-Displacement
c. Using the amounts of aluminum metal and HBr from the equation, determine which one is the limiting reactant. ✱ Note I used H_2 in the problem but you could also find g $AlBr_3$

$$0.145\text{ g Al} \times \frac{1\text{ mol Al}}{26.98\text{ g Al}} \times \frac{3\text{ mol } H_2}{2\text{ mol Al}} \times \frac{2.02\text{ g } H_2}{1\text{ mol } H_2} = \boxed{0.0163\text{ g } H_2}$$

$$0.0100\text{ L HBr} \times \frac{1.5\text{ mol HBr}}{1\text{ L}} \times \frac{3\text{ mol } H_2}{6\text{ mol HBr}} \times \frac{2.02\text{ g } H_2}{1\text{ mol } H_2} = \boxed{0.0152\text{ g } H_2}$$

✱ HBr is limiting R.

2. You are asked to make 200 mL of a 0.500 M solution of zinc sulfate. How many grams of zinc sulfate do you need?

1 L = 1000 mL

$$0.200\text{ L } ZnSO_4 \times \frac{0.500\text{ mol } ZnSO_4}{1\text{ L}} \times \frac{161.44\text{ g } ZnSO_4}{1\text{ mol } ZnSO_4} = \boxed{16.1\text{ g } ZnSO_4}$$

3. You titrated 10 mL of HCl with 9.8 mL of 2.0 M NaOH. What is the molarity of the HCl?

$HCl + NaOH \rightarrow H_2O + NaCl$ 1000 mL = 1 L

$$0.0098\text{ L NaOH} \times \frac{2.0\text{ mol NaOH}}{1\text{ L}} \times \frac{1\text{ mol HCl}}{1\text{ mol NaOH}} = 0.020\text{ mol HCl}$$

$$M = \frac{\text{mol}}{\text{L}} = \frac{0.020\text{ mol HCl}}{0.010\text{ L}} = \boxed{2.0\text{ M}} \rightarrow \text{molarity of HCl}$$

4. Name the following compounds (some are molecular or ionic. Name any acids using acid naming rules:

a. N_2O_3 → dinitrogen trioxide
b. CO → carbon monoxide
c. P_2O_5 → diphosphorus pentoxide
d. SO_2 → sulfur dioxide
e. Fe_2O_3 → iron (III) oxide
f. HI → hydroiodic acid
g. $CaCO_3$ → calcium carbonate