2nd SEMESTER FINAL WARMUPS

Moles:

Find the empirical formula of a compound that is 48.38% carbon, 8.12% hydrogen, and 53.5% oxygen by mass. If the actual molar mass is 328g, what is the actual molecular formula? ($C_{12}H_{24}O_{10}$)

What is the empirical formula for a compound if an 8.1g sample contains 4.9g of magnesium and 3.2g of oxygen? (MgO)

How many liters are there in .005mol of Ne gas? (.112L)

How many mol are there in 54.89mL of H_2 gas? ($2.45x10^{-3}$mol)

Gas:

Combined Gas Law
2 liters of gas are collected in a lab where the temperature is 25 C and the pressure is 1.04 atm. What would the volume have been at standard temperature and pressure?

Ideal Gas Law
2 moles of gas were collected at 103 kPa and 25 C. What was the volume of the container?

Variables affecting the volume of a gas and names of gas laws.
　　　　Assume that you have a 20 ml sample of gas in a syringe. If the volume is lowered to 10 ml and the temperature is held constant, how will the pressure change? Answer qualitatively and quantitatively.

_____　　_____　　_____
qualitative answer　　　　　　quantitative answer　　　　　　name of gas law

　　　　Assume that you adjusted the syringe so that the volume is back at 20 ml. If you heat the syringe while maintaining a constant pressure, what will happen to the plunger?

_____　　　　_____
answer　　　　　　　　　　　　　`　　　　　name of gas law

　　　　Again assume that you have a 20 ml sample of gas, but this time it is in a flask. If the temperature is raised while the volume is held constant, what will happen to the pressure?

_____　　　　_____
answer　　　　　　　　　　　　　　　　　name of gas law

Ideal Gas Law and Molecular Weight

　　　　112 grams of gas are collected at 95 kPa and 20.0 C. The volume of the gas is 102.52 liters. What is the molar mass of the gas?
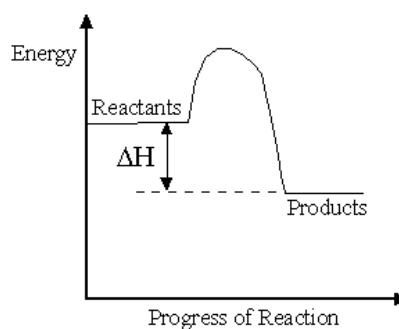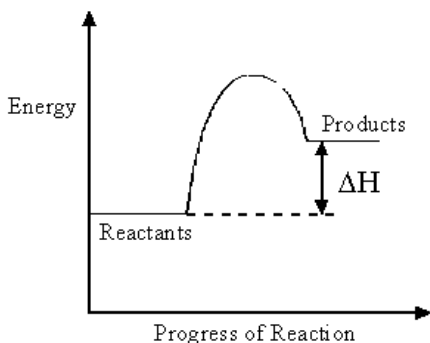
Heat:
Calculate Q (in kJ) when 287 g of water is heated from 29.8°C to 87.5°C. The specific heat capacity of water is 4.184 J/g°C. (69.29 kJ)
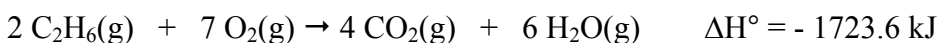

Calculate Q when 20.6g of water is freezing. Heat of fusion of water is 334J/g. Assume that the water is added at 0°C. ( )

A metal sample with a mass of 50 g at 100.0°C is placed into 400 g a water at 20.0°C. If the final temperature is 22.10°C, what is the specific heat of the metal sample? (Assume that there is no heat lost to the surroundings.) (C = 0.90276 J/g°C)

Label the graphs exothermic and endothermic:

Using the following equation, calculate the observed heat of this reaction if 6.50 mol of ethane are consumed.

$2 C_2H_6(g) + 7 O_2(g) \rightarrow 4 CO_2(g) + 6 H_2O(g)$ $\Delta H° = - 1723.6$ kJ

Bonding:

Which type of bond involves the transfer of electrons from one atom to another atom?
    Why do the atoms in this type of bond attract one another?

Use dot structures and arrows to illustrate ionic bond formation between Al and S.

Which type of bond involves the sharing of (or fighting over) electrons between two atoms?
    What holds the atoms together in this type of bond?

Draw the Lewis Structure for the following molecules or ions:
NH_3 CO_2 NO_3^- NO_2^- H_2O CF_4

What is is the electron domain geometry and molecular geometry of each of these molecules / ions?

What intermolecular forces are exhibited by each of these molecules / ions?

Consider H_2O and CO_2. Which exists as a liquid at room temperature? Why? (You must use intermolecular forces to justify your answer.)

Which of the following would exhibit the greatest LDF's?
    $C_{10}H_{22}$ or C_5H_{12}
Which of these would have the highest rate of evaporation?
Which would have the highest boiling point?

Organic:

Answer the following questions regarding organic compounds.

1. What hydrocarbon family has only single bonds?

2. Would you describe a hydrocarbon with only single bonds as saturated – or unsaturated?

3. Write the number of carbons indicated by each of the following prefixes.

Meth   _____
Eth   _____
Prop   _____
But   _____
Pent   _____
Hex   _____
Hept   _____
Oct   _____
Non   _____
Dec   _____

4. What is the structural difference between an alkane and an alkene?

5. How many hydrogens would you expect to find in each of the following?:

a. pentane   _____
b. pentene   _____
c. butane   _____
d. butene   _____

6. Draw functional groups for each of the following:

a. alcohol

b. carboxylic acid

c. amine

7. Draw the structural formula for cyclohexane.

Solutions:
Molarity to g

What is the molarity of a 5.00 liter solution that was made with 10.0 moles of KBr ?

How many grams of $CaCl_2$ would be used in the making of .500L of a 5.0M solution?

How do you identify a strong acid? Provide examples…
How do you identify a strong base? Provide examples…
How do you identify a soluble ionic compound? Provide examples…
What do all 3 have in common??? (strong electrolytes!)

Collig prop – when you put in a solute, lowers freezing temp. increase b.p.
When it is icy outside, why do you put down salt?

Redox
Ginen an eq, qhat was reduced, what ws oxidized
(single repl
double repl – not redox – noting gets reduced or oxidized

Acid-Base:

What is the pH range of an acidic solution?

What is the pH range of a basic solution?

Identify the following as acids or bases:
       HCl   NaOH $HC_2H_3O_2$ NH_3 NH_4Cl

What is the pH of a solution which contains a hydronium ion concentrationf 0.0050 M?

The following data were collected at the endpoint of a titration performed to find the molarity of an NaOH solution.
                Volume of base (NaOH) used = 16.8 mL
                Volume of acid (HCl) used = 26.7 mL
                Molarity of acid (HCl) = 0.50 M
    What is the molarity of the base solution?