

Name: _____

Chemistry 121
Test 4
Spring 2007

You have 75 minutes to complete this 100 point test. Please mark each answer clearly and show all work. You may use a simple scientific calculator. NO GAPHING CALCULATORS.

I. Fill in the blank

1. (1 pt) The weakest intermolecular forces are called _____.
2. (1 pt) The phase change that occurs when going from a gas directly to a solid is referred to as _____.
3. (1 pt) _____ Law inversely relates pressure to volume at constant temperature and amount.
4. (2 pts) A non-ideal gas (real gas) occurs under conditions of _____ and _____.
5. (1 pt) _____ is the mixing of gases due to their molecular motion.
6. (1 pt) Macromolecular carbohydrates that store large amounts of energy are called _____.
7. (2 pts) All amino acids contain a(n) _____ functional group and a(n) _____ functional group.
8. (1 pt) The building blocks of nucleic acids are termed _____.

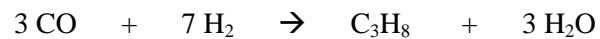
II. Calculations: Clearly show all work for full credit.

1. (10 pts) A 35.8 L sample of Ar is allowed to expand to 1875 L. If the temperature is held constant and the final pressure is 721 mmHg, what must have been the original pressure of the gas?

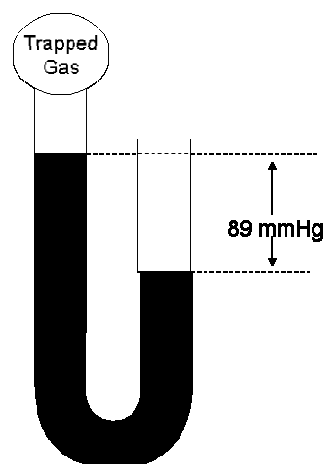
2. (15 pts) PH_3 is used in the manufacture of flame-retardant chemicals.
- What is the mass of this gas (in mg) if 27.6 mL of PH_3 is collected at STP? (MM of PH_3 = 33.99 g/mol)

b. How many molecules of PH_3 are present? (MM of PH_3 = 33.99 g/mol)

3. (15 pts) What volume of propane gas, C_3H_8 , is generated by the reaction of 2.0 g of CO with 7.0 g of H_2 if the propane is collected at 15°C and 745 mmHg? (MM of CO = 28.01 g/mol; MM of H_2 = 2.016 g/mol)

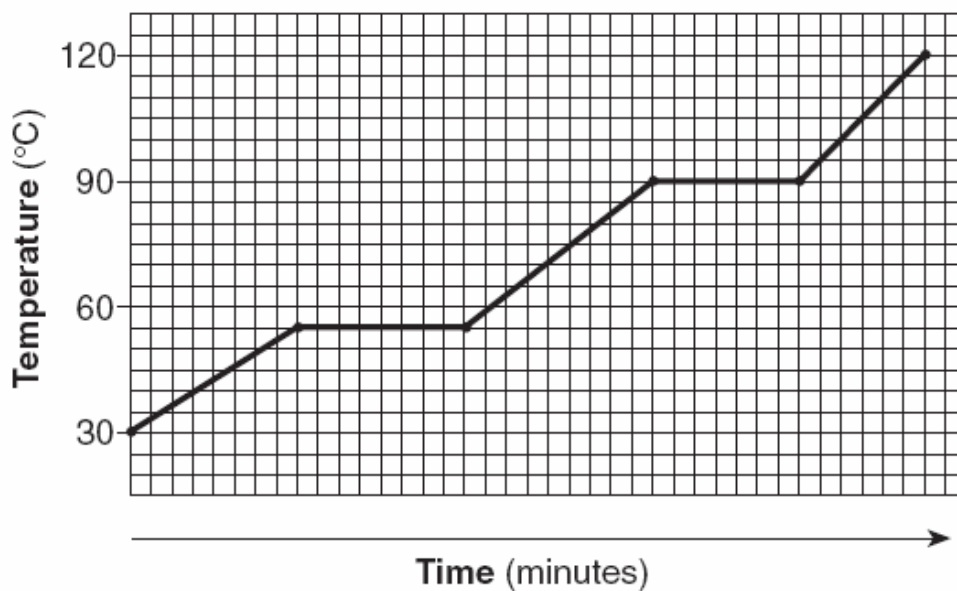


4. (10 pts) A sample of O_2 gas was collected in a u-tube over water at $30^\circ C$. Given the diagram, calculate the partial pressure of O_2 (in atm), if the atmospheric pressure is 748 mmHg and the vapor pressure of water at $30^\circ C$ is 31.83 mmHg.



III. Phase Changes and Trends

- (10 pts) Use the graph below to answer the following questions:
 - This graph is a representation of a(n) _____.
 - On the graph, clearly indicate the regions that correspond to the three phases: solid, liquid and gas using a S, L and G.
 - According to the curve, the compound boils at _____ $^\circ C$.



- (10 pts) Rank the following gases in order of rates of diffusion from slowest to fastest: N_2 , O_2 , SO_2 , F_2 and NO_2 .

_____ < _____ < _____ < _____ < _____

- (4 pts) In the following groups, circle the compound with the highest boiling point:

a. C_3H_8 or C_4H_{10}

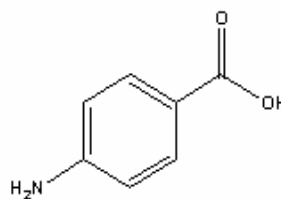
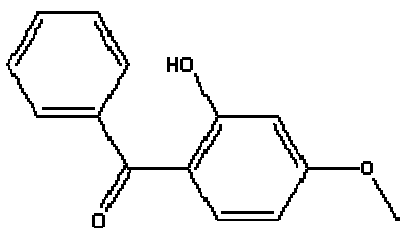
b. Cl_2 or SO_3

4. (6 pts) Rank the three main types of intermolecular forces from weakest to strongest.

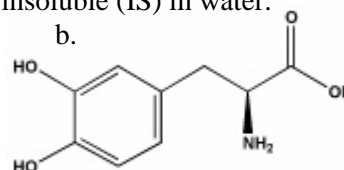
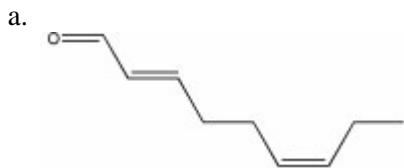
_____ < _____ < _____

IV. Organic Compounds, Biochemicals and Forces

1. (7 pts) Circle and identify the important functional groups in the following molecules
a. b.



2. (3 pts) State if the following molecules are soluble (SOL) or insoluble (IS) in water.



3. (6 pts) Identify the following segment as DNA or RNA and write the complementary base pairing.
a. AAGCTTA b. UUAACCC

4. (4 pts) Place a circle around the terminal amine group and a triangle around the terminal carboxylic acid group in the following peptide chain.

