

Name: _____

Chemistry 121
Test 4
Fall 2007

You have 50 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. (2 pt) Before you open a 2L of soda pop, a _____ exists between the gas and vapor phases. One you open the bottle, you disturb this and according to _____, the system will respond to counteract the disturbance.
2. (3 pt) The double helix of DNA is held together by _____. (be specific) These forces result in a pairing of adenine with _____ and cytosine with _____.
3. (3 pt) A gas no longer follows the gas laws and becomes a(n) _____ gas at conditions of high _____ and low _____.
4. (2 pts) If a gas is at STP, the gas has a pressure of _____ atm and a temperature of _____ °C.

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

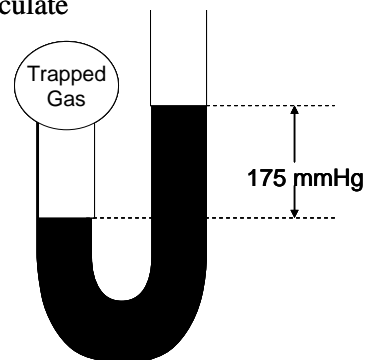
1. (15 pts) The space shuttle relies on several fuel systems to lift off. One of those fuel systems, solid rocket booster propellant (SRB) relies on a reaction of aluminum with ammonium perchlorate. What volume (in L) of N_2 would be generated from the reaction of 1.00×10^5 g Al with excess ammonium perchlorate if the temperature is 3200°C and the pressure is 1.00×10^2 atm?



2. (10 pts) Helium gas in a 20.0L tank has a pressure of 45.0 atm at 57°C . What would be the temperature (in °C) if the pressure is increased to 65.0 atm?

3. (10 pts) A mixture of gases (A, B and C) in a 15L container has a total pressure of 758 mmHg at 25°C. What is the mole fraction and mole percent of gas A if the partial pressure of gas A is 225 mmHg?

4. (10 pts) A gas was collected in a u-tube at 28°C. Given the diagram below, calculate the partial pressure of O₂ (in atm), if the atmospheric pressure is 748 mmHg.



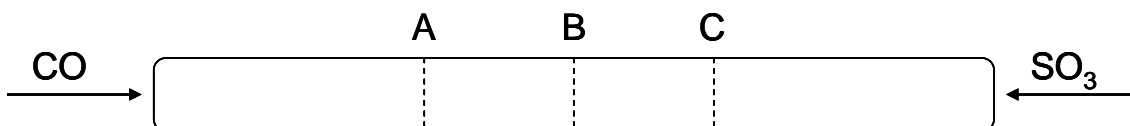
III. Phase Changes and Trends

1. (10 pts) Rank the following gases in order of increasing boiling point: N₂, O₂, Cl₂, F₂ and H₂.

_____ < _____ < _____ < _____ < _____

2. (10 pts) Draw a heating curve for a substance that melts at 50°C and boils at 200°C. Correctly label the axes and indicate the phases using S, L and G.

3. (5 pts) Two gases are allowed to diffuse as seen in the diagram below. Indicate where the gases will meet (Point A, B or C) and then in one sentence explain why.

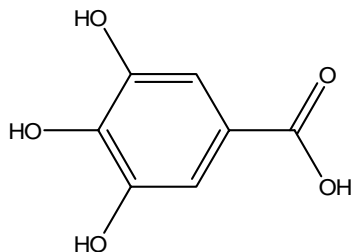


IV. Organic Compounds, Biochemicals and Forces

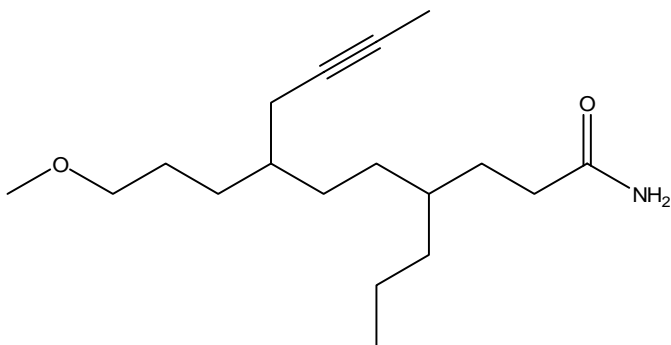
1. (10 pts) Give an example of a strand of RNA with 5 nucleotides. Then, write the complimentary base pair.

2. (10 pts) Circle and identify the important functional groups in the following molecules. Also indicate if the molecules would be soluble or insoluble in water.

a. Soluble in water or Insoluble in water?



b. Soluble in water or Insoluble in water?



3. (10 pts) Choose one of the following to answer in 4 – 6 grammatically correct sentences.

a. Explain the difference between monosaccharides and polysaccharides; give examples when each would best be used for an energy source and why.

b. Explain the importance of shape in a protein's ability to function and discuss what three things can alter its shape.