

Name: _____

Chem 121, Spring 2009
Test 4, Form A

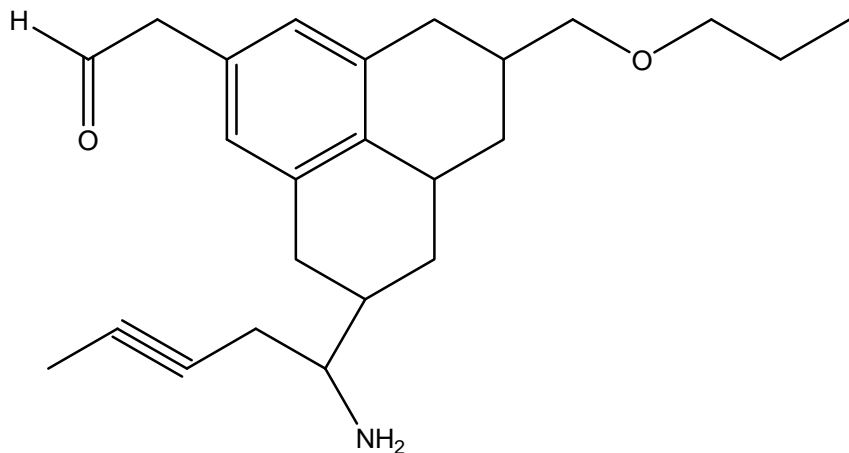
You have 75 minutes to complete this 100 point test. Please mark each answer clearly and show all work. You may use a scientific calculator.

I. Multiple Choice (15 pts): Circle the best answer.

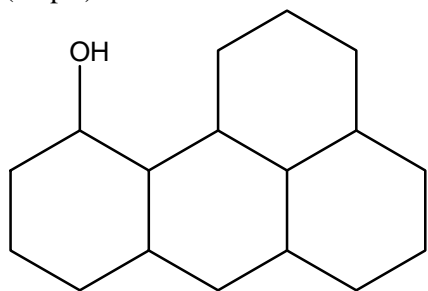
- _____ is the measure of the ability of a molecule to distort its electron cloud.
 - Energy
 - Wetting
 - Surface tension
 - Polarizability
- Viscosity is affected by _____.
 - intermolecular forces
 - molecular size
 - both a and b
 - neither a or b
- _____ Law inversely relates pressure and volume at a constant amount and Kelvin temperature.
 - Charles'
 - Boyle's
 - Guy-Lussac's
 - Avogadro's
- Polypeptides are always written so that the N-terminus is:
 - on the right end of the molecule.
 - in the center of the molecule.
 - on the top of the molecule.
 - on the left end of the molecule.
- STP represents conditions where:
 - T = 0 K and P = 0 atm.
 - T = 0 K and P = 1 atm.
 - T = 298 K and P = 0 atm.
 - T = 298 K and P = 1 atm.

II. Organic Chemistry and Biochemistry (25 pts)

1. (10 pts) Circle and name all major functional groups in the molecule below.

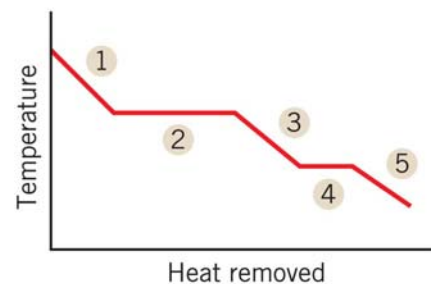


2. (5 pts) Fill-in the blank with the appropriate word.
- The building blocks of proteins are called _____.
 - The two classes of organic bases that are found in nucleotides are _____ and _____.
 - The complimentary base-pairing for AUGGGCAU is _____.
 - _____ are a class of biological molecules whose only requirement is that they contain long chains of hydrocarbons.
3. (10 pts) Indicate if the molecule below will be soluble or insoluble in water (a polar solvent) and explain why.



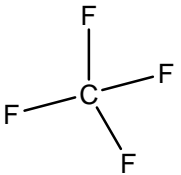
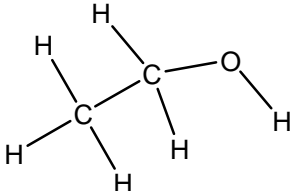
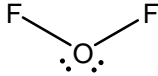
III. Forces, Trends and Phase Changes (30 pts)

1. (10 pts) In 4 - 6 grammatically complete sentences and using the diagram (at right), identify and describe the curve, making sure to note all five regions.



1. (10 pts) Draw a phase diagram for a substance that has a nfp of 25°C , a nbp of 125°C , a triple point at 0.80 atm and 75°C , and a critical point at 1.6 atm and 150°C . Label the axes, the phases, the nfp, the nbp, the triple point and the critical point.

2. (10 pts) For each substance below, list the types of intermolecular forces present and then rank them from lowest to highest boiling point using numbers one through five (1 – 5), so that #1 would have the lowest boiling point and #5 would have the highest boiling point. (Hint: you might want to look at the molecular geometry.)

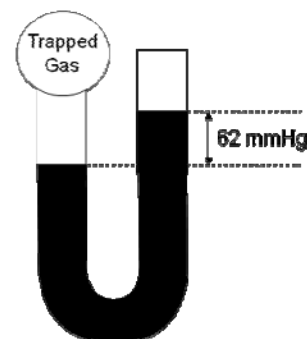
	Forces Present	Rank
		
		
Ar		
H – Cl		
		

IV. Gases (40 pts): Show all work for calculations or you will not receive any credit.

1. (5 pts) What volume of O₂ is needed to exactly react with 2.5 L of CH₄ if the reaction temperature and pressure are kept constant throughout?



2. (15 pts) An unknown gas with mass of 1.00 g is trapped in the open-ended manometer seen at right. The atmospheric pressure is 745 mmHg.
- What is the pressure of the trapped gas in atm?



- What is the molar mass of the gas if the volume is 0.500 L and the temperature is 37°C?

3. (10 pts) A scuba diving tank usually contains a mixture of nitrogen and oxygen. A typical tank (with a volume of 11.1L) inside an air-conditioned dive shop has a pressure of 204.2 atm at a temperature of 25°C. By the time the diver gets the tank out to the ocean, the temperature has risen to 32°C. What is the new pressure of the gas in the tank?
4. (10 pts) What is the mole fraction and mole percent of oxygen and nitrogen in the above tank if the oxygen pressure is 43.9 atm at 32°C?