

Exam 4
Form A
Chemistry 121
Fall 2003

DIRECTIONS

You have 75 minutes to complete this 100-point exam. Indicate your exam form on the line marked "SUBJECT" on the scantron. You may only use a nonprogrammable calculator. NO GRAPHING CALCULATORS ALLOWED!

- Which process is most likely to lead to acid rain?
(A) the indiscriminate spraying of herbicides
(B) incomplete combustion of gasoline
(C) emission of freon from aerosol cans
(D) the burning of high-sulfur coal
- The kinetic-molecular theory of ideal gases assumes that
(A) the collisions of gas molecules result in a loss of energy.
(B) all gas molecules travel at the same speed.
(C) the volume of a gas molecule is negligible.
(D) gas molecules exert no pressure on the walls.
- Which gas has the greatest average kinetic energy at a given temperature?
(A) H₂
(B) Ne
(C) CO₂
(D) None; the kinetic energy is the same for each gas.
- Under the same conditions of temperature and pressure, the gas whose molecules possess the highest average speed is
(A) H₂O (B) O₂ (C) Ne (D) F₂
- Which has lowest freezing point?
(A) 0.2 *m* CaCl₂
(B) 0.2 *m* BaSO₄
(C) 0.2 *m* sugar
(D) H₂O
- Which substance has the highest boiling point?
(A) CH₄ (B) He (C) HF (D) Cl₂
- Arrange Ne, NH₃, and CH₄ in order of increasing boiling point.
(A) CH₄<Ne<NH₃ (C) NH₃<Ne<CH₄
(B) CH₄<NH₃<Ne (D) NH₃<CH₄<Ne
- At constant volume, the pressure of gas **Y** increases with increasing temperature because as the temperature increases,
(A) molecules of **Y** move faster.
(B) the molecular volume of **Y** increases.
(C) the mass of **Y** molecules increases.
(D) molecular collisions are more elastic.
- The stronger the intermolecular forces in a substance,
(A) the lower the boiling point.
(B) the higher the boiling point.
(C) the higher the vapor pressure.
(D) the smaller the deviation from ideal gas behavior.
- Non-ideal behavior for a gas is most likely to be observed under conditions of:
(A) standard temperature and pressure.
(B) low temperature and high pressure.
(C) low temperature and low pressure
(D) high temperature and high pressure.
- A macromolecule consisting of several repeating units of much smaller molecules is called a (n):
(A) monor.
(B) monomer.
(C) functional group.
(D) polymer.

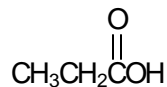
12. What main functional group is present in the following molecule?

(A) thiol

(B) carboxylic acid

(C) amine

(D) ketone



13. Which is the formula of an alcohol?

(A) $\text{CH}_3\text{CH}_2\text{CH}_2\text{—O—CH}_3$

(B) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{—OH}$

(C) $\text{CH}_3\text{CH}_2\text{—}\overset{\text{O}}{\parallel}\text{C—CH}_3$

(D) $\text{CH}_3\text{CH}_2\text{CH}_2\overset{\text{O}}{\parallel}\text{C—H}$

14. If the solution outside a cell has a higher concentration than inside the cell, it is called

(A) isotonic

(B) hypotonic.

(C) hypertonic.

(D) heterogeneous.

15. A _____ is used to measure the pressure of the atmosphere.

(A) manometer

(B) spectrometer

(C) barometer

(D) tensiometer

16. Which of the following forces is NOT prevalent in molecular solids?

(A) dispersion forces

(B) hydrogen bonding

(C) dipolar forces

(D) covalent bonding

17. Normal boiling point occurs at what pressure?

(A) 760 atm

(B) 1 atm

(C) 755 mmHg

(D) 755 atm

18. Which of the following is NOT found in DNA?

(A) adenine

(B) guanine

(C) cytosine

(D) uracil

19. Amino acids are monomer molecules of:

(A) proteins.

(B) ketones.

(C) lipids.

(D) carbohydrates.

20. The helices of DNA are connected by:

(A) covalent bonds.

(B) ionic bonds.

(C) metallic bonds.

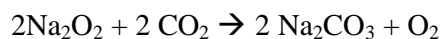
(D) hydrogen bonds.

II. Short Answer, Calculations and Essay (30 pts): Clearly indicate your answer in the space provided. Partial credit will be given for correct work. If I cannot read the work, it will not be graded.

1. (5 pts) What is the complementary structure for the following **DNA** base sequence:

ATAAGCTTAC

2. (10 pts) The reaction of sodium peroxide (Na_2O_2) with CO_2 is used in space vehicles to remove CO_2 from the air and generate O_2 for breathing. How many moles of O_2 can be made from 3.0 mols Na_2O_2 and 15.0L of CO_2 gas at 2.50 atm and at 15°C ?



3. (5 pts) A gas mixture with a total pressure of 745 mmHg is composed of 0.250 mol of N_2 and 0.500 mol of CO_2 . What is the partial pressure of N_2 in the mixture in mmHg?

4. In 3-4 **grammatically correct** sentences, discuss how oxides of nitrogen are formed in our troposphere and how they affect our environment.