Name_____
Write your name on the back too.

Physiological Chemistry I
Exam III
Dr. Melissa Kelley
November 2, 2007

You have 50 minutes to complete this exam. Provide the one best answer for each, following the instructions given in each section of the exam.

Perform the following calculations: Credit will only be given if you show all of your work including equations and units. Your answer should contain the correct number of significant figures.

1. (10 points) I take a hot air ballon ride in which on the ground the ballon has a pressure of 1.50 atm and a volume of 283 L at a temperature of 20 $^{\circ}$C. The ballon rises to a height of 0.550 atm and a volume of 722 L. What is the temperature in $^{\circ}$C?
Useful information 1 atm = 760 torr
R= 0.0821 L atm/mol K

2. (10 points) A student in Dr. Kelley's laboratory has a 1.0 L 2.5 M vitamin A solution. The student adds 500.0 mL of water. What is the concentration of this new solution?

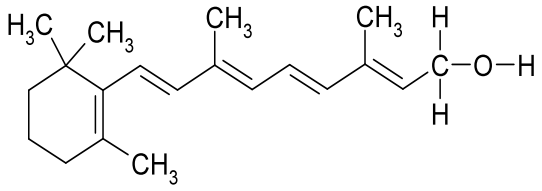
3. (10 points) After taking an extremely hard Dr. Kelley physiological chemistry exam and earning a perfect score, you decide to celebrate and have a well earned glass of champagne. Champagne is made through the following chemical process in which glucose is fermented to ethanol and carbon dioxide. The **balanced** chemical reaction is shown below:

$C_6H_{12}O_6$ (aq) →	2 C_2H_5OH (aq)	+	2 CO_2 (g)
Glucose	ethanol		carbon dioxide

If you start with 1.00 mole of glucose, how much pressure (from the CO_2) is exerted from a 1.00 L bottle of champagne at 25.0 ˚C. Useful information: R=0.0821 L atm/K mole

b) (4 points) How could you make the CO_2 more soluble in the champagne?

4. (10 points) Shown below is Dr. Kelley's favorite compound vitamin A. Using your knowledge of hydrogen bonding, show how water would hydrogen bond to this compound (show two water molecules, one acting as an acceptor and the other acting as a donor).



Multiple Choice: Select the one best answer for each question. Multiple answers will not be accepted. Each question is worth 3 points.

_____5.Which of the following compounds would have the lowest boiling point?

A. CH_3CH_2OH B. CH_4 C. D.

_____6. How many grams of NaCl are in 350 mL of a 1.00 % (w/v) solution of NaCl?

A. 0.35 g B. 3.5 g C. 350 g D. 35 g

_____7. Which of the following statements **is not** correct?

A. Viscosity takes into account attractive forces between molecules.
B. Condensation results when gas molecules have increased kinetic energy.
C. Non-polar molecules can induce temporary dipoles in other molecules through Van der Waals interactions.
D. Gases having low pressures are more easily compressible.

_____8. Which of the following conditions would make Cl_2 gas behave ideally?

A. Increasing the temperature and decreasing attractive forces.
B. Increasing the temperature and increasing attractive forces.
C. Increasing the pressure and decreasing the distance between molecules.
D. Decreasing the pressure and increasing the distance between the molecules.
E. A and D are correct.
F. B and C are correct.

_____9. What is the effect on volume of a gas if you double its pressure and halve its temperature?

A. Volume increases by a factor of 4.
B. Volume decreases by a factor of 4.
C. Volume increases by a factor of 2.
D. Volume decreases by a factor of 2.

_____10. Which of the following molecules has a hydrogen bond donor and acceptor?

A. $CH_3CH_2NHCH_3$ B. $CH_3CH_2CH_3$ C. $CH_3CH_2OCH_3$ D. $CH_3CH_2N(CH_3)_2$

_____11. Which of the following statements **is not** correct?

A. Increasing the pressure of a gas will decrease its solubility.
B. Increasing the temperature of a gas will decrease its solubility.
C. HCN is a polar gas.
D. CH_4 is more of an ideal gas than HCl.

_____12. Which of the following statements **is not** correct?

A. Decreasing the temperature of a gas will decrease its volume.
B. Increasing the pressure of a gas will decrease its volume.
C. Decreasing the number of moles of a gas will increase its volume.
D. Decreasing the volume of the gas will increase its temperature.

_____13. Which of the following gases **is not** an ideal gas?

A. O_2
B. H_2
C. H_2O
D. CO_2

_____14. A sample of oxygen occupies 1.00 L. If the temperature remains constant, and the pressure of the oxygen is doubled, what is the new volume?

A. 3.00 L B. 1.50 L C. 2.0 L
D. 0.500 L E. 0.333 L

_____15. Which of the following statements is **not true** of the kinetic molecular theory of gases?

A. Compressing a polar gas will disrupt intermolecular forces of the gas.
B. Decreasing the pressure of a polar gas will disrupt intermolecular forces of the gas.
C. Increasing the temperature a polar gas will disrupt intermolecular forces of the gas.
D. Gases are in constant random motion.

_____16. How many moles of NaOH are present in 500.0 mL of a 0.750 *M* solution?

A. 0.15 moles NaOH
B. 0.375 moles NaOH
C. 3.75 moles NaOH
D. 5 moles NaOH

17. (20 points) Complete the products and balance the following equation: All coefficients including the number one must be shown to receive maximum credit. **ANY COEFFICIENTS NOT SHOWN WILL BE MARKED WRONG.**

a. $AgNO_3 + \quad FeCl_3 \rightarrow$

b. $Na_2S + \quad Al(NO_3)_3 \rightarrow$