

**READ THESE DIRECTIONS CAREFULLY BEFORE STARTING THE EXAMINATION!**

It is *extremely* important that you fill in the answer sheet EXACTLY as indicated, otherwise your test may not be processed; ALL entries are to be made on SIDE 1 of the answer sheet. Use a #2 pencil (or softer); fill in the circles completely and firmly. Erasures must be complete. Use only the following categories:

NAME:	Print your name starting at the first space, LAST NAME first, then a space, followed by your FIRST NAME, then another space, followed by your MIDDLE INITIAL. Fill in the <u>correct</u> circles below your printed name corresponding to the letters of your name; for the spaces, fill in the top blank circle.
STUDENT NUMBER:	This is <b><u>VERY IMPORTANT!</u></b> Put in your complete Social Security number beginning in column A and continuing through column I (do NOT use column J at this time) under IDENTIFICATION NUMBER; be sure to fill in the correct circles (a common error to be avoided is mistaking "0" for "1").
TEST FORM:	Fill in the "1" blank in the J column under IDENTIFICATION NUMBER (to indicate Hour Examination I).
SPECIAL CODES:	Use for course and section number; in positions K-P write in the following: 100-005-011
SIGNATURE:	You <b><u>MUST</u></b> sign the examination answer sheet (bubble sheet) on the line directly above your printed name. Use your legal signature.

**Answering Questions:**

Starting with answer "1" on SIDE 1, fill in the circle indicating the one best answer for each of the 20 questions in this examination. Your score is the sum of the appropriate credit for each response. An examination key will be posted in Blackboard on Friday afternoon.

**Grading and Reporting:**

The examination scores will be posted in Blackboard within 96 hours of the examination.. If an error has been made in scoring your answers, tell your instructor within 48 hours of the posting of your score.

**BE SURE THAT YOUR TEST HAS 20 QUESTIONS, A PERIODIC TABLE, AND ONE SHEET OF SCRATCH PAPER.**  
You may **NOT** use your own scratch paper during this examination.

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EXAMINATION 1

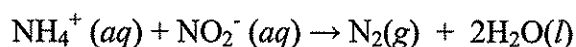
A&S 100/CHE 113  
University of Kentucky

8 March 2007  
Department of Chemistry

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- 1) Which of the following types of footwear are appropriate for laboratory use?
- a) Flip flops
  - b) Shoes with closed toes that cover your feet completely.
  - c) Sandals
  - d) Ventilated shoes
- 
- 2) If you come in contact with a substance in lab that causes your skin to burn, what should you do first?
- a) Wipe it off with a paper towel.
  - b) Find out what it is so you can know how to treat it.
  - c) Run cold water over the affected area from a sink or shower.
  - d) Douse it with baking soda.
- 
- 3) To prevent other students/labmates from unknowingly coming into contact with chemicals you should:
- a) Immediately clean up any spilled chemicals.
  - b) Cover a spill so no one can see it.
  - c) Clean up your workspace at the end of lab with a wet paper towel before you leave.
  - d) A and C
- 
- 4) There is a smaller change in temperature ( $\Delta T$ ) when butanol evaporates than when pentane evaporates because:
- a) Pentane has stronger intermolecular forces than butanol .
  - b) Butanol has hydrogen bonding while pentane does not.
  - c) Pentane has a lower molar mass than butanol.
  - d) Butanol contains trace amounts of water.
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- 5) Dispersion forces are
- a) stronger than hydrogen bonds.
  - b) the result of temporary dipole moments induced in ordinarily nonpolar molecules.
  - c) are the same as bonding forces.
  - d) nuclear forces.
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- 6) Dipole-dipole forces are
- attractive forces between nonpolar molecules.
  - attractive forces between an ion and a dipole.
  - attractive forces between polar compounds.
  - attractive forces between crystals.
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- 7) You are working in a research lab and you need to make a 2.0 L solution of 0.50 M HCl. You have a bottle of concentrated HCl which is 11.6 M. How much of the concentrated HCl do you need?
- 3.1 mL
  - 12 mL
  - 8.6 mL
  - 1.0 L
- 
- 8) The rate law for the iodide catalyzed decomposition of  $\text{H}_2\text{O}_2$  is  $\text{rate} = k[\text{H}_2\text{O}_2][\text{I}^-]$ . Which of the following statements is false?
- The reaction is second order overall.
  - The reaction is first order with respect to the iodide concentration.
  - $k$  is the rate constant.
  - the rate of the reaction does not depend on the concentration of the  $\text{I}^-$ .
- 
- 9) What is the concentration of a 11.6 M HCl solution in terms of mass percent? The density of the HCl solution is 1.18 kg/L.
- 10.2 %
  - 37.8 %
  - 85 %
  - 49.9 %
- 
- 10) What are the values of  $m$  and  $n$  for the following equation?



$$\text{Rate} = k[\text{NH}_4^+]^m[\text{NO}_2^-]^n$$

Experiment	Initial Concentration of $\text{NH}_4^+$	Initial Concentration of $\text{NO}_2^-$	Initial Rate ( $\text{mol L}^{-1} \text{s}^{-1}$ )
1	0.100 M	0.0050	$1.35 \times 10^{-7}$
2	0.100 M	0.010	$2.70 \times 10^{-7}$
3	0.200 M	0.010	$5.40 \times 10^{-7}$

- $m = 0$  and  $n = 1$
  - $m = 1$  and  $n = 2$
  - $m = 2$  and  $n = 1$
  - $m = 1$  and  $n = 1$
-

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11) The activation energy of a reaction is:

- a) The change in energy of a reaction.
  - b) The energy of the product minus the energy of the reactant.
  - c) The minimum amount of energy necessary to initiate a reaction.
  - d) The total energy of a reaction.
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12) The concentration of a standard solution is 0.025 M and has an absorbance of 0.135. What is the concentration of a solution of the same substance whose absorbance is 0.092? Assume the solutions follow Beer's Law.

- a) 0.0034 M
  - b) 0.037 M
  - c) 0.50 M
  - d) 0.017 M
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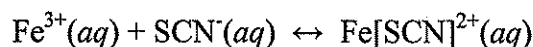
13) The rate constant of a first-order reaction is  $3.46 \times 10^{-2} \text{ s}^{-1}$  at 298 K. What is the rate constant at 350K if the activation energy for the reaction is 50.2 kJ/mol?

- a)  $0.702 \text{ s}^{-1}$
  - b)  $0.0493 \text{ s}^{-1}$
  - c)  $-3.01 \text{ s}^{-1}$
  - d)  $0.0406 \text{ s}^{-1}$
- 

14) Chemical equilibrium is achieved when:

- a) The equation is balanced and  $Q_c > K$ .
  - b) The forward and reverse reaction rates are equal and the reaction is complete.
  - c) The rates of the forward and reverse reactions are equal and the concentrations of the reactants and the products remain constant.
  - d)  $Q_c < K$  and there is no catalyst present to increase the rate of the reaction.
- 

15) What is the equilibrium constant expression for the following reaction?



a) 
$$K_c = \frac{[\text{FeSCN}^{2+}]}{[\text{Fe}^{3+}][\text{SCN}^{-}]}$$

b) 
$$K_c = \frac{[\text{Fe}^{3+}][\text{SCN}^{-}]}{[\text{Fe}^{2+}][\text{SCN}^{-}]}$$

c) 
$$K_c = \frac{[\text{Fe}^{3+}]}{[\text{Fe}^{2+}]}$$

d) 
$$K_c = \text{Fe}^{3+} \frac{[\text{SCN}^{-}]}{[\text{SCN}^{-}]}$$

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16) The following solutions are combined: 25.0 mL of 0.10 M NaCl, 25.0 mL of 0.10 M of BaCl<sub>2</sub>, and 50.0 mL of 0.10 M KBr. What is the [Cl<sup>-</sup>] concentration in the resulting solution. Assume all volumes are additive.

- a) 0.10 M                      b) 0.20 M                      c) 0.075 M                      d) 0.13 M
- 

17) A titration is a procedure where a solution of known concentration is added to another solution of unknown concentration until the chemical reaction between the two solutions is complete. The solution of known concentration is called

- a) an indicator.                      b) a base.                      c) a standard.                      d) an acid.
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18) A quantity of 18.68 mL of a KOH solution is needed to neutralize a 0.4218 g of monoprotic KHP (MW of KHP = 204.2 g/mol). What is the concentration (in molarity) of the KOH solution?

- a) 0.01000 M                      b) 4.623 M                      c) 0.01106 M                      d) 0.1106 M
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19) In a titration experiment, 20.4 mL of 0.883 M HCOOH (monoprotic) neutralize 19.3 mL of Ba(OH)<sub>2</sub>. What is the concentration of the Ba(OH)<sub>2</sub> solution?

- a) 1.87 M                      b) 0.933 M                      c) 0.883 M                      d) 0.467 M
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20) In an acid-base titration the point at which the acid has completely reacted with or been neutralized by the base is known as the

- a) equivalence point.  
b) end point.  
c) half way point.  
d) ion product.
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## Spring 2007 Midterm Exam Key

1. B
2. C
3. D
4. B
5. B
6. C
7. 86 mL
8. D
9. 35.8%
10. D
11. C
12. D
13. A
14. C
15. A
16. C
17. C
18. D
19. D
20. A