

University of Kentucky

Department of Chemistry

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 VERY IMPORTANT! Put in your 8 DIGIT NEW STUDENT ID NUMBER (do not use the 9 at the beginning of your number) beginning in column A and continuing through column H, column I will be blank, (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 "2" blank in the J column under IDENTIFICATION NUMBER (to indicate Hour Examination II).
SPECIAL CODES:	Use for course and section number; in positions K-P write in the following:
SIGNATURE:	You MUST 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 30 questions in this examination. Your score is the sum of the appropriate credit for each response. Soon after the examination is finished, an examination key will be posted on Blackboard shortly after 9:15 PM.

Grading and Reporting:

The examination scores will be posted in Blackboard within 96 hours after 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 30 QUESTIONS, A PERIODIC TABLE, AND ONE SHEET OF SCRATCH PAPER. You may NOT use your own scratch paper during this examination. Cell phones and pagers are to be turned off and out of sight during the exams.

- Which of the following statements is true regarding glove use in the lab?
 - Gloves should be saved and re-used at the next lab session.
 - Gloves should always be removed before leaving the lab.
 - If you can't see anything on your gloves, then they are considered clean.
 - Gloves are required in the lab at all times.
- What information is given in a Material Safety Data Sheet (MSDS)?
 - Instructions on how to complete a particular experiment in the lab.
 - How a particular chemical can be synthesized.
 - Information about the hazards and exposure limits of a particular chemical.
 - All of the above information is included in an MSDS.
- When should you use the safety shower?
 - When you realize you forgot to take a shower before coming to class.
 - To rinse a small spill of a chemical on your hand.
 - When a large amount of a chemical is spilled on your body.
 - Any of the above.
- What are the electron pair geometry and molecular geometry (shape), respectively, of SeO_3^{2-} ?
 - Tetrahedral, trigonal pyramid
 - Tetrahedral, tetrahedral
 - Square planar, trigonal pyramid
 - Square planar, tetrahedral
- How many non-bonding electrons are there around the oxygen in the correct Lewis structure of COF_2 ? Carbon is the central atom.
 - 0
 - 4
 - 6
 - 8
- A central atom has 6 electron groups around it, including one lone pair. What is the electron pair geometry?
 - trigonal bipyramid
 - tetrahedral
 - square pyramid
 - octahedral
- The freezing point of a 2.00 m aqueous solution of KCl was -0.9°C . What would you expect to find for the freezing point of a 1.00 m aqueous solution of CaBr_2 ? Assume the freezing point of water under the experimental conditions is 0°C .
 - -0.9°C
 - -0.2°C
 - -1.6°C
 - -0.7°C
- Which of the following aqueous solutions would have the highest boiling point?
 - 0.5 m AlCl_3
 - 1.5 m NaCl
 - 1.5 m sucrose
 - 1.0 m KCl
- What are the units of the rate constant, k, for a third order reaction?

16. The system, $C(s) + CO_2(g) \rightleftharpoons 2CO(g)$, is at equilibrium. Which of the following changes will result in a decrease in the amount of carbon monoxide present?
- I. Addition of C
II. Decreasing the size of the container
III. Addition of an inert gas.
IV. Removal of CO_2 from the system
- a. I and IV b. II and III c. II and IV d. II, III, and IV
17. For an acid-base titration with one equivalence point, the equivalence point will be greater than 7 for which of the following combinations?
- a. Strong acid vs Strong base
b. Strong acid vs Weak base
c. Weak acid vs Strong base
d. Additional information is needed
18. 25.0 mL of HCl was titrated to the second equivalence point with a 18.5 mL of a Na_2CO_3 solution which was prepared by dissolving 0.325 g of Na_2CO_3 in 50.0 mL of distilled water. What is the concentration of HCl solution?
- a. 0.0907 M b. 0.0543 M c. 0.0227 M d. 4.91 M
19. What is the pH of a 0.030 M NaOH solution?
- a. 1.52 b. 0.030 c. 12.48 d. 14.01
20. Which of the following statements is false?
- a. Diprotic acids have two protons per molecule.
b. CH_3COOH is a polyprotic acid.
c. Polyprotic acids dissociate in multiple steps.
d. Polyprotic acids will have more than one equivalence point in a complete titration.
21. What is the pH of a solution which is 0.40 M CH_3COOH and 0.30 M CH_3COONa ? The K_a of acetic acid is 1.8×10^{-5} .
- a. 4.86 b. 4.62 c. 4.74 d. 4.95
22. Which of the following pairs can be combined in aqueous solution to make a buffer?
- a. NaOH and NaCl
b. HCl and CH_3COOH
c. CH_3COOH and CH_3COONa
d. HCl and NaCl
23. A student created a saturated $Ca(OH)_2$ solution and titrated with HCl to determine the K_{sp} for calcium hydroxide experimentally. If the student's K_{sp} value from the experiment was 4.82×10^{-5} and the literature value is 5.02×10^{-6} (both calculated at 25°), what is the percent error?
- a. 0.896% b. 8.60% c. 89.6% d. 860%
24. What is the solubility product constant for $Mg(OH)_2$ if 35 ml of 0.050 M HCl solution was required to reach the equivalence point in the titration of 30. ml of $Mg(OH)_2$ saturated solution?

- a. 9.9×10^{-5} b. 7.9×10^{-4} c. 4.0×10^{-4} d. 5.0×10^{-5}

25. What is the solubility production expression for $\text{Ba}_3(\text{PO}_4)_2$?

- a. $K_{sp} = \frac{[\text{Ba}^{2+}]^3[\text{PO}_4^{3-}]^2}{[\text{Ba}_3(\text{PO}_4)_2]}$ c. $K_{sp} = [\text{Ba}^{2+}]^3[\text{PO}_4^{3-}]^2$
 b. $K_{sp} = \frac{[\text{Ba}^{2+}][\text{PO}_4^{3-}]}{[\text{Ba}_3(\text{PO}_4)_2]}$ d. $K_{sp} = [\text{Ba}_3(\text{PO}_4)_2]$

26. Which of the following best describes a saturated solution?

- a. Any solution that is greater than 10.0 M.
 b. A solution in which the maximum amount of solute has been dissolved.
 c. A solution in which the maximum amount of solvent has been used.
 d. A solution in which an infinite amount of solute will dissolve.

27. Which of the following will be soluble in water?

- I. NaOH II. CaCO_3 III. CaSO_4

- a. I and II b. II and III c. III only d. I only

28. The addition of vinegar (acetic acid) leads to the formation of CO_2 gas when combined with certain compounds. Which of the following types of compounds will react with vinegar in this way?

- a. nitrates b. chlorides c. carbonates d. sulfates

29. An unknown solution contains one nitrate compound. The addition of 6 M HCl results in a clear solution (i.e. no precipitate). Which of the following cations might be present in solution?

- a. Pb^{2+} c. Ca^{2+}
 b. Ag^+ d. None of the cations listed can be in the solution.

30. Qualitative tests of a chemical compound

- a. Depend on the amount of a substance.
 b. Depend on the physical properties of a substance.
 c. Depend on the chemical properties of a substance.
 d. Depend on both the physical and chemical properties of a substance.

Fall 2008 Final Exam Key

1. B
2. C
3. C
4. A
5. B
6. D
7. D
8. B
9. A
10. B
11. A
12. A
13. C
14. D
15. B
16. C
17. C
18. A
19. C
20. B
21. B
22. C
23. D
24. A
25. C
26. B
27. D
28. C
29. C
30. D