

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 answer sheet 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>VERY IMPORTANT!</b> Under IDENTIFICATION NUMBER, put in your <b>8 DIGIT STUDENT ID NUMBER (do not use the 9 at the beginning of your number)</b> beginning in column A and continuing through column H, column I will be blank, (do NOT use column J at this time); 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 one of the following:  <table style="margin-left: auto; margin-right: auto;"> <tr> <td>Dr. Yates</td> <td>105-001, 105-002</td> </tr> <tr> <td>Dr. Holler</td> <td>105-401</td> </tr> </table>	Dr. Yates	105-001, 105-002	Dr. Holler	105-401
Dr. Yates	105-001, 105-002				
Dr. Holler	105-401				
SIGNATURE:	You <b>MUST</b> sign the examination answer sheet (bubble sheet) on the line directly above your printed name. Use your legal signature.				

Answering Questions:

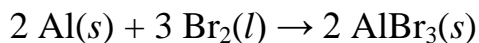
Starting with answer "1" on SIDE 1, fill in the circle indicating the one best answer for each of the 30 questions in this examination. Your score is the sum of the appropriate credit for each response. On the day following the examination, an examination key will be posted on Blackboard.

Grading and Reporting:

The examination scores will be posted in Blackboard as soon as possible after the examination. If an error has occurred in scoring your answers, inform 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, computer, and pagers are to be turned off and out of sight during the exam.

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1. For the reaction given below, how much  $\text{AlBr}_3$  will be produced if 12 moles of  $\text{Br}_2$  react with excess aluminum?



- A. 4 mol  
B. 8 mol  
C. 12 mol  
D. 16 mol

- 
2. An excess of  $\text{N}_2$  reacts with 3.024 g of  $\text{H}_2$  to form ammonia ( $\text{NH}_3$ ). If ammonia is the only product of the reaction, what mass of ammonia is formed?

- A. 17.01 g  
B. 1.10 g  
C. 14.01 g  
D. 3.02 g

- 
3. In the reaction given below, calculate the mass of  $\text{C}_{14}\text{H}_9\text{Cl}_5$  that will be produced by the reaction of 25.0 g of each of the reactants.

Molar masses:  $\text{C}_2\text{HOCl}_3$ , 147.4 g/mol;  $\text{C}_6\text{H}_5\text{Cl}$ , 112.5 g/mol;  $\text{C}_{14}\text{H}_9\text{Cl}_5$ , 354.5 g/mol



- A. 78.7 g  
B. 157 g  
C. 354 g  
D. 39.4 g

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4. Which of the following solutions will have the highest concentration of chloride ions?

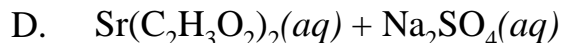
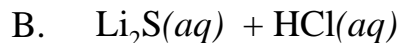
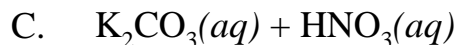
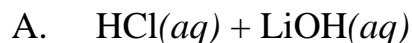
- A. 0.10 M  $\text{NaCl}$   
B. 0.10 M  $\text{MgCl}_2$   
C. 0.10 M  $\text{AlCl}_3$   
D. 0.05 M  $\text{CaCl}_2$

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5. What is the concentration of a solution that results when 14.2 g of  $(\text{NH}_4)_3\text{PO}_4$  is dissolved in water and diluted to exactly 250.0 mL?

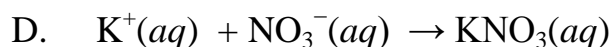
- A. 0.381 M  
B. 56.8 M  
C. 0.238 M  
D. 1.52 M
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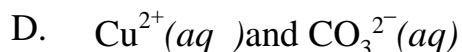
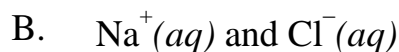
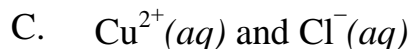
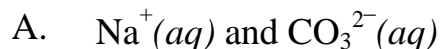
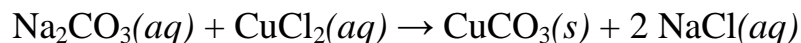
6. Which of the following aqueous solutions will form a precipitate when mixed?



7. What is the net ionic equation for the reaction of  $\text{AgNO}_3$  and  $\text{KBr}$ ?



8. Identify the spectator ions in the following reaction equation.



9. Which of the following statements about acids and bases is **false**?

A. Reactions between strong acids and bases are called neutralization reactions.

B. Acids tend to taste sour.

C. Bases increase the concentration of hydroxide ion in water.

D. Acids are produced by the reduction of water.

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10. The titration of 25.0 mL of a solution of  $\text{H}_2\text{SO}_4$  of unknown concentration requires 83.6 mL of 0.12 M  $\text{LiOH}$  solution. What is the concentration of the  $\text{H}_2\text{SO}_4$  solution?

A. 0.20 M

C. 0.10 M

B. 0.40 M

D. 0.25 M

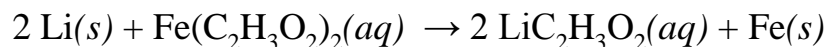
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11. What is the oxidation number of phosphorus in  $\text{CaHPO}_4$ ?

- A. -3  
B. +5  
C. -1  
D. +1
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12. What is the reducing agent in the following reaction?



- A. O  
B. C  
C.  $\text{Fe}^{2+}$   
D. Li
- 

13. At constant temperature, 10.0 L of  $\text{N}_2$  at 747 mmHg is compressed to 2.88 L. What is the final pressure of  $\text{N}_2$ ?

- A. 3.41 atm  
B. 2.98 atm  
C. 0.283 atm  
D. 0.293 atm
- 

14. What pressure will 14.0 g of CO gas exert in a 3.5 L container at 75 °C?

- A. 4.1 atm  
B. 5.0 atm  
C. 6.4 atm  
D. 2.3 atm
- 

15. The density of gaseous hydrogen sulfide at 21 °C and 1.29 atm is

- A. 1.52 g/L.  
B. 1.77 g/L.  
C. 1.82 g/L.  
D. 34.1 g/L.
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16. A 0.334 g sample of a halogen gas occupies 109 mL at 398 K and 1.41 atm. What is the identity of the halogen?

- A.  $\text{F}_2$   
B.  $\text{Cl}_2$   
C.  $\text{Br}_2$   
D.  $\text{I}_2$
-

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17. In a mixture of  $\text{CO}(g)$  and  $\text{CO}_2(g)$ , the mole fraction of  $\text{CO}$  ( $X_{\text{CO}}$ ) is 0.115. If the total pressure of the mixture is 2.50 atm, the partial pressure of  $\text{CO}_2$  is

A. 0.288 atm.

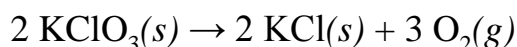
C. 2.21 atm.

B. 1.25 atm.

D. 2.50 atm.

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18. What volume of  $\text{O}_2$  gas at STP is formed when 50.0 g of  $\text{KClO}_3$  decomposes? The molar mass for  $\text{KClO}_3$  is 122.55 g/mol.



A. 8.22 L

C. 12.3 L

B. 9.14 L

D. 13.7 L

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19. The average kinetic energy of a sample of a gas is directly proportional to its

A. pressure.

C. temperature.

B. volume.

D. number of moles.

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20. Which can be used to calculate the properties of a nonideal gas?

A. Charles's Law

C. Avogadro's Law

B. van der Waals equation

D. Dalton's Law of Partial Pressures

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21. One way of stating the first law of thermodynamics is that

A. the amount of work done on a system is independent of pathway.

B. the total energy in or out of a system is equal to the sum of the heat absorbed and the work done on the system.

C. the heat flow in or out of a system is independent of pathway.

D. the total work done on a system must equal the heat absorbed by the system.

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22. What is the change in internal energy ( $\Delta E$ ) for a system that gives off 45.0 kJ of heat and performs 875 J of work on the surroundings?

A. 44.1 kJ

C. -45.9 kJ

B. -44.1 kJ

D.  $9.00 \times 10^2$  kJ

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23. When 175 g of  $\text{H}_2\text{O}$  at 24.1 °C is mixed with an unknown mass of  $\text{H}_2\text{O}$  at a temperature of 55.1 °C, the final temperature of the mixture is 36.6 °C. What is the mass of the second sample of  $\text{H}_2\text{O}$ ? The specific heat of water is 4.184 J/g·K.

A. 32.8 g

C. 102 g

B. 75.0 g

D. 118 g

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24. What is the final temperature of a gold nugget (mass = 376 g) that starts at 398 K and loses 4.85 kJ of heat when it is lost in a snow bank? The specific heat capacity of gold is 0.128 J/g·°C.

A. 499 K

C. 315 K

B. 377 K

D. 297 K

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25. A gas is compressed from 39.92 L to 12.97 L at a constant pressure of 5.00 atm. The work ( $w$ ) for this process is

A. 135 L·atm.

C. -135 L·atm.

B. -9.82·L atm.

D. 9.82 L·atm.

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CHE 105 SP 2011 Exam 2 key

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