

CHE 105 EXAMINATION III**November 10, 2011****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 circles</u> 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! Under IDENTIFICATION NUMBER, put in your 8 DIGIT 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); be sure to fill in the correct circles (a common error to be avoided is mistaking "0" for "1").
TEST FORM:	Fill in the "3" blank in the J column under IDENTIFICATION NUMBER (to indicate Hour Examination III).
SPECIAL CODES:	Use for course and section number; in positions K-P write in one of the following: Dr. Woodrum 105-001, 105-005 Dr. Guzman 105-002 Dr. Soult 105-003, 105-004 Dr. Ladipo 105-006 Dr. Kuhler 105-007 Dr. Holler 105-401
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. 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. How much heat is transferred when 35 g of aluminum initially at 25 °C is heated to 35°C? $C_{s, \text{Al}} = 0.903 \text{ J/g}\cdot^{\circ}\text{C}$
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- A. 3.9×10^2 J C. 7.9×10^2 J
B. 3.2×10^2 J D. 5.5×10^2 J
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2. A 50.3 g iron rod initially at 66.4 °C is submerged in 97.8 g of water at 17.5 °C. What is the final temperature of both substances at thermal equilibrium?
($C_{s, \text{iron}} = 0.449 \text{ J/g} \cdot ^\circ\text{C}$ and $C_{s, \text{water}} = 4.18 \text{ J/g} \cdot ^\circ\text{C}$; assume that the iron and the water are thermally isolated from everything else)

- A. 20.1 °C C. 18.6 °C
B. 36.0 °C D. 55.3 °C
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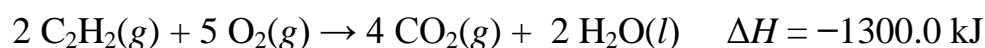
3. Calculate the change in internal energy for a system that absorbs 35.8 kJ of heat and whose volume increases from 8.00 L to 24.0 L at 1.00 atm. (Note: 101.3 J = 1 L atm).

- A. +51.8 kJ C. -16.6 kJ
B. -15.8 kJ D. +34.2 kJ
-

4. Which one of the following statements is false?

- A. In an endothermic process heat is transferred from the surroundings to the system.
B. Heat is transferred from the system to the surroundings in an exothermic process.
C. The work done by a system is a state function.
D. The units of specific heat capacity are joules per gram per °C.
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5. Given the following thermochemical equation, what mass in grams of acetylene, C_2H_2 , is required to produce 3.50×10^3 kJ of heat?



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- B. Electrons will be ejected, and they will have greater kinetic energy than those ejected previously.
 - C. Electrons will be ejected, and they will have the same kinetic energy as those ejected previously.
 - D. Electrons will be ejected, and they will have lower kinetic energy than those ejected previously.
-

13. Which one of the following statements is true?

- A. The principal quantum number can have integer values beginning with zero.
 - B. The size of an *s* orbital is inversely proportional to the value of the principal quantum number.
 - C. The energies of orbitals within a given shell increase as the principal quantum number increases.
 - D. Each principal quantum number shell has *s*, *p*, *d*, and *f* orbitals.
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14. Which one of the following sets of quantum numbers correctly specifies a *p* orbital?

- A. $n = 3; l = 1, m_l = -1$
 - B. $n = 3; l = 0, m_l = 0$
 - C. $n = 3; l = 2, m_l = 1$
 - D. $n = 3; l = 1, m_l = -2$
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15. Which one of the following sets of quantum numbers is not possible?

- A. $n = 4, l = 3, m_l = -2, m_s = +1/2$
 - B. $n = 3, l = 2, m_l = -3, m_s = -1/2$
 - C. $n = 3, l = 0, m_l = 0, m_s = +1/2$
 - D. $n = 4, l = 1, m_l = 1, m_s = -1/2$
-

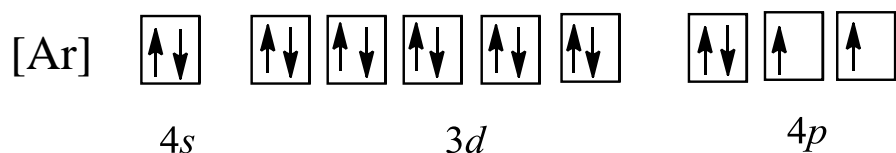
16. Calculate the wavelength of the line in the hydrogen spectrum that results when an electron falls from the $n = 5$ to the $n = 3$ level.

- A. 54.2 nm
 - B. 95.0 nm
 - C. 1140 nm
 - D. 1280 nm
-

electron's energy.

- C. Penetration of a lower energy orbital by an electron in a higher energy orbital results in reduction of the electron's energy.
- D. Repulsion between two negatively charged particles increases as the charges of the particles increase.

21. Which ground-state atom has an electron configuration described by the following orbital diagram?



- A. selenium C. germanium
B. phosphorus D. tellurium

22. What is the ground state electron configuration for fluorine?

- A. $1s^22s^2$ C. $1s^22s^22p^2$
B. $1s^22s^22p^1$ D. $1s^22s^22p^5$

23. Write the ground state electron configuration of chromium. How many electrons have $n = 3$ and $l = 2$?

- A. 3 C. 5
B. 4 D. 6

24. Arrange these elements in order of decreasing atomic radius:

Sb, Se, Pb

- A. $Se > Sb > Pb$ C. $Sb > Pb > Se$
-

B. $\text{Pb} > \text{Sb} > \text{Se}$

D. $\text{Pb} > \text{Se} > \text{Sb}$

25. What is the electron configuration of Tc^{2+} ?

A. $[\text{Kr}]4d^5$

C. $[\text{Kr}]5s^23d^3$

B. $[\text{Kr}]5s^24d^5$

D. $[\text{Kr}]5s^24d^7$

26. Which one of the following cations is largest?

A. I^-

C. Br^-

B. F^-

D. Cl^-

27. Which one of the following elements has the smallest first ionization energy?

A. K

C. Be

B. Cl

D. Na

28. Which one of the following elements has the lowest electron affinity?

A. bromine

C. sulfur

B. carbon

D. sodium

29. Most energy in the United States comes from

A. the capture of solar energy.

C. the generation of nuclear power.

B. hydroelectric power.

D. the combustion of fossil fuels.

30. An excited electron in a hydrogen atom relaxes to a $5s$ orbital, emitting light of 64.5 THz. What was the original principal quantum level of the electron?

A. 4

C. 7

B. 8

D. 6

CHE 105 FALL 2011 Exam 3 key

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