

# CHE 105 ALTERNATE EXAMINATION I February 7, 2013

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 "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 one of the following:<br><br>Dr. Owen                      105001 to 105009<br>Dr. Yates                      105010 to 105018<br>105401, 105405, 105409, 105410  |
| 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 33 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 33 QUESTIONS, A PERIODIC TABLE, AND ONE SHEET OF SCRATCH PAPER.** You may NOT use your own scratch paper during this examination. Cell phones, computers, and pagers are to be turned off and out of sight during the exam.

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1. A solid exhibits:

- A. no definite shape and no definite volume.
- B. a definite volume and no definite shape.
- C. no definite shape and a definite volume.
- D. a definite volume and a definite shape.

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2. A chemist analyzed a sample using distillation and density measurements. Given the information above, which of the following statements is true?

- A. The chemist analyzed a mixture taking advantage of physical and chemical properties.
- B. The chemist only performed experiments taking advantage of physical properties.
- C. The chemist separated all the components of a mixture into elements.
- D. The chemist only performed experiments taking advantage of chemical properties.

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3. Which of the following is an example of a chemical change?

- A. Metallic copper develops a green discoloration over time.
- B. Alcohol evaporates.
- C. Salt dissolves in water.
- D. Ice melts.

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4. What prefix multiplier is  $10^{15}$ ?

- A. giga
  - B. mega
  - C. tera
  - D. peta
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5. Which of the following is equal to  $3.6 \times 10^3$  L?

- A. 0.36 L  
B. 0.0036 L  
C. 36 L  
D. 3600 L

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6. Tween-20 is a detergent used in many scientific applications and has a molar mass of 1228 g/mol. What is the density of Tween-20 if 2.00 kg occupies a volume of  $1.826 \times 10^3$  mL?

- A. 0.1095 g/mL  
B. 0.913 g/cm<sup>3</sup>  
C. 1.10 g/cm<sup>3</sup>  
D.  $8.92 \times 10^{-4}$  g/mL

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7. Which two extensive properties can be combined to produce an intensive property?

- A. length and mass  
B. length and temperature  
C. volume and mass  
D. mass and temperature

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8. What is the answer to the calculation below?

$$3.14159 + (2.718)^3 \times 3.8 =$$

- A. 79.44289  
B. 88  
C.  $7.6 \times 10^2$   
D. 79

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9. How many mg are contained in a 433 kg sample?

- A.  $4.33 \times 10^{-4}$  mg  
B.  $4.33 \times 10^{-3}$  mg  
C.  $4.33 \times 10^8$  mg  
D.  $4.33 \times 10^6$  mg
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10. A 1970s era sports car has a top speed of 160 miles per hour (mph). What is the car's top speed in kilometers per second?

A. 257 km/s

C.  $7.15 \times 10^{-1}$  km/s

B.  $7.15 \times 10^{-2}$  km/s

D. 257 km/s

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11. Which of the following did not contribute to the formation of Dalton's atomic theory?

A. The law of multiple proportions

B. The law of definite proportions

C. The law of conservation of mass

D. The law of conservation of energy

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12. Which of the following is not one of the postulates of Rutherford's nuclear theory?

A. Most of the atom's mass is contained in the nucleus.

B. The nucleus is composed of neutrons and protons.

C. Most of the atom is composed of empty space.

D. There are as many negatively charged particles outside of the nucleus as positively charged particles in the nucleus of a neutral atom.

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13. Which of the following is charged but does not reside in the atomic nucleus?

A. the neutron

C. the gluon

B. the proton

D. the electron

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14. Complete the following table:

| <i>Atomic Number</i> | <i>Atomic Mass</i> | <i>Neutrons</i> | <i>Atomic Symbol</i> |
|----------------------|--------------------|-----------------|----------------------|
| 34                   | <b>W</b> =         | 43              | <b>X</b> =           |
| <b>Y</b> =           | 97                 | 54              | <b>Z</b> =           |

- A.  $W=77, X=Se, Y=43, Z=Tc$       C.  $W=77, X=Ir, Y=54, Z=Xe$   
B.  $W=77, X=Se, Y=97, Z=Bk$       D.  $W=9, X=F, Y=43, Z=Tc$

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15. Which of the following elements is a metal?

- A. carbon                                      C. selenium  
B. tin    D. arsenic

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16. Complete the following table:

| <i>Atomic Number</i> | <i>Charge</i> | <i>Electrons</i> | <i>Ion Symbol</i> |
|----------------------|---------------|------------------|-------------------|
| 26                   | 3+            | <b>W</b> =       | <b>X</b> =        |
| 53                   | <b>Y</b> =    | 54               | <b>Z</b> =        |

- A.  $W=23, X=Fe^{3+}, Y=1^-, Z=I^-$       C.  $W=23, X=V^{3+}, Y=1^-, Z=Xe^-$   
B.  $W=29, X=Fe^{3+}, Y=1^+, Z=I^+$       D.  $W=29, X=Fe^{3+}, Y=1^-, Z=I^-$

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17. What is the atomic mass of a new element, if it has two naturally occurring isotopes,  $^{293}\text{X}$  and  $^{297}\text{X}$ , with the following masses and natural abundances?

|                  |            |        |
|------------------|------------|--------|
| $^{293}\text{X}$ | 292.73 amu | 63.17% |
| $^{297}\text{X}$ | 296.78 amu | 36.83% |

- A. 293.9 amu                                      C. 294.2 amu  
B. 295.5 amu                                      D. 296.3 amu
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18. How many moles of antimony are in 410.0 grams of antimony?

- A.  $3.243 \times 10^{-24}$  moles                      C. 3.367 moles  
B. 1.953 moles                                      D.  $6.808 \times 10^{-22}$  moles

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19. How many atoms are in 70.0 grams of CO, carbon monoxide?

- A.  $1.50 \times 10^{24}$  atoms                      C.  $4.52 \times 10^{24}$  atoms  
B.  $3.01 \times 10^{24}$  atoms                      D.  $7.53 \times 10^{23}$  atoms

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20. A covalent bond typically forms from what combination of elements?

- A. a metal and a metal                      C. a metal and a nonmetal  
B. a nonmetal and a nonmetal              D. a transition metal and an alkaline earth metal

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21. What is the empirical formula for  $C_5H_2NS_2$ ?

- A. CHNS    C.  $C_5H_2NS_2$   
B.  $C_{2.5}HN_{0.5}S$                                       D.  $C_{10}H_4N_2S_4$

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22. Which of the following statements provides the best description of chemical bonding?

- A. Ionic bonds result from electron sharing between atoms while covalent bonds result from electrostatic attractions between cations and anions.  
B. Metals always bond to nonmetals.  
C. Covalent bonds result from electron sharing between atoms, while ionic bonds result from electrostatic attractions between cations and anions.  
D. Nonmetals always bond to other nonmetals.
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23. What is the formula for the compound formed when rubidium reacts with sulfur?

- A. RbS  
B. Rb<sub>2</sub>S  
C. RbS<sub>2</sub>  
D. Rb<sub>2</sub>S<sub>3</sub>

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24. What is the chemical name for Na<sub>3</sub>PO<sub>4</sub>?

- A. Trisodium phosphate  
B. Sodium(I) phosphate  
C. Sodium phosphate  
D. Trisodium monophosphate

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25. What is the chemical formula of sodium hypochlorite?

- A. NaClO  
B. NaClO<sub>2</sub>  
C. NaClO<sub>3</sub>  
D. NaClO<sub>4</sub>

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26. What is the chemical name for PBr<sub>3</sub>?

- A. Phosphorus tribromide  
B. Monophosphorus tribromide  
C. Phosphorus(III) tribromide  
D. Phosphorus bromide

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27. Which element contributes the greatest mass to the human body?

- A. nitrogen  
B. calcium  
C. oxygen  
D. hydrogen

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28. What is the molecular mass of C<sub>4</sub>H<sub>10</sub>?

- A. 58.123 amu  
B. 58 g/mol  
C. 58.123 g/mol  
D. 58 amu

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29. How many molecules of N<sub>2</sub>O<sub>4</sub> are in 76.3 g of N<sub>2</sub>O<sub>4</sub>?  
molar mass of N<sub>2</sub>O<sub>4</sub> = 92.02 g/mol

- A.  $5.54 \times 10^{25}$  N<sub>2</sub>O<sub>4</sub> molecules  
B.  $7.26 \times 10^{23}$  N<sub>2</sub>O<sub>4</sub> molecules  
C.  $1.38 \times 10^{24}$  N<sub>2</sub>O<sub>4</sub> molecules  
D.  $4.99 \times 10^{23}$  N<sub>2</sub>O<sub>4</sub> molecules
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30. How many grams of oxygen are in 12.0 grams of  $C_6H_{12}O_6$ ?  
molar mass of  $C_6H_{12}O_6 = 180.16$  g/mol

- A. 3.00 grams  
B. 6.39 grams  
C. 4.80 grams  
D.  $8.06 \times 10^{-1}$  grams

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31. What is the empirical formula for a compound that is 63.65% nitrogen and 36.35% oxygen by mass?

- A.  $N_2O$   
B.  $NO_2$   
C.  $N_2O_3$   
D.  $NO_3$

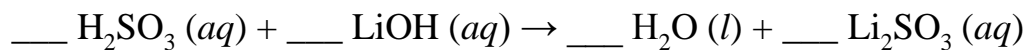
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32. A compound has an empirical formula of  $CH_2$  and a molar mass of 841.61 g/mol.  
What is the molecular formula of the compound?

- A.  $C_{50}H_{100}$   
B.  $C_{30}H_{60}$   
C.  $C_{40}H_{80}$   
D.  $C_{60}H_{120}$

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33. When the equation below is correctly balanced with the smallest values of whole numbers as coefficients, what is the coefficient of the lithium sulfate?



- A. 1  
B. 2  
C. 4  
D. 6
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CHE 105 SP 2013 Exam 1 key

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