CHE 105 EXAMINATION I February 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 correct 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!** 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 "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:
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.

1. In which of the following answers is each example a pure substance?

A. orange juice, water, and wine
B. water, wine, and neon gas
C. steam, water, and oxygen gas
D. vegetable soup, wine, and oxygen gas

2. A pure substance that is composed of two or more different elements is

A. an atom.
B. a homogeneous mixture.
C. a chemical compound.
D. a heterogeneous mixture.

3. Which of the following is an example of a physical property?

A. Dynamite explodes.
B. Honey tastes sweet.
C. A silver platter tarnishes.
D. Ice floats on top of liquid water.

4. Which SI prefix means 10^{-12}?

A. kilo
B. nano
C. pico
D. micro

5. If the diameter of an atom is approximately 1.5×10^{-8} cm, what is the atom's diameter?

A. 1.5×10^{-19} nm
B. 0.15×10^{-15} nm
C. 1.5×10^{-10} nm
D. 1.5×10^{-1}nm

6. A box has dimensions of 1.51 inches by 2.74 inches by 4.72 inches. What is its volume in cubic centimeters?

A. 1.19 cm^3
B. 8.41×10^{-2} cm^3
C. 7.69 cm^3
D. 3.20×10^{2} cm^3

7. The Hope diamond weighs 44.0 carats (1 carat = 0.200 g). If the density of the diamond is 3.5 g/cm^3 at 20°C, what is the volume of the diamond?

A. 2.5 cm^3
B. 0.40 cm^3
C. 0.16 cm^3
D. 63 cm^3

8. What is the correct answer to the following expression?
$(3.33 \times 10^{-5} + 8.13 \times 10^{-7}) / 1.8633$

A. 2×10^{-5}
B. 1.8×10^{-5}
C. 1.83×10^{-5}
D. 1.831×10^{-5}

9. A person walking rapidly requires 5.0 kcal of energy per minute. How many minutes of such exercise are required to consume 400 kcal, the equivalent of one milk shake?

A. 0.013 minutes
B. 5.0 minutes
C. 80 minutes
D. 120 minutes

10. Which is a correct method of determining the number of liters of gasoline required to fill a 35-gallon tank in an automobile? (1.000 liter = 1.057 quarts, 4 quarts = 1 gallon)

A. $35 \text{ gallons} \times \frac{4 \text{ quarts}}{1 \text{ gallon}} \times \frac{1 \text{ liter}}{1.057 \text{ quarts}}$

B. $35 \text{ gallons} \times \frac{1 \text{ gallon}}{4 \text{ quarts}} \times \frac{1 \text{ liter}}{1.057 \text{ quarts}}$

C. $35 \text{ gallons} \times \frac{1 \text{ gallon}}{4 \text{ quarts}} \times \frac{1.057 \text{ quarts}}{1 \text{ liter}}$

D. $\frac{35 \text{ gallons}}{\frac{4 \text{ quarts}}{1 \text{ gallon}} \times \frac{1.057 \text{ quarts}}{1 \text{ liter}}}$

11. From the gold foil scattering experiment, Rutherford established that:

A. protons are not evenly distributed throughout the atom.
B. electrons have a negative charge.
C. atoms are made of protons, neutrons, and electrons.
D. protons are 1840 times lighter than electrons.

12. All of the following statements are true **except** ____.

A. For any neutral atom, the number of protons is equal to the number of electrons.
B. Isotopes of an element have the same atomic number.
C. The mass number is the sum of the number of protons and neutrons in an atom.
D. All atoms of a given element have the same mass number.

13. A neutral atom of ^{31}S consists of:

A. 15 protons, 16 neutrons, and 15 electrons.
B. 16 protons, 31 neutrons, and 16 electrons.
C. 16 protons, 16 neutrons, and 15 electrons.
D. 16 protons, 15 neutrons, and 16 electrons.

14. Which of the following ions has an **incorrect** charge?

A. Mg^{2+}
B. Rb^{+}
C. N^{3-}
D. Cl^{+}

15. An aluminum ion, Al^{3+}, has:

A. 13 protons and 13 electrons.
B. 13 protons and 10 electrons.
C. 10 protons and 13 electrons.
D. 16 protons and 13 electrons.

16. Silver has an atomic mass of 107.9 amu. If 51.84% of Ag exists as Ag-107 (106.9051 amu), what is the identity and the atomic mass of the only other isotope?

A. Ag-108; 107.9 amu
B. Ag-109; 109.0 amu
C. Ag-109; 109.9 amu
D. Ag-110; 109.9 amu

17. Which of the following is **not** a mole?

A. 55.847 grams of iron metal
B. 6.022×10^{23} copper atoms
C. 16 grams of sulfur
D. exactly 12 grams of ^{12}C atoms

18. Calculate the number of moles of phosphorus atoms in 10.0 mg of phosphorus.

A. 1.78×10^{-4} moles
B. 2.40×10^{-4} moles
C. 0.140 moles
D. 3.23×10^{-4} moles

19. How many atoms are in 5.54 g of fluorine gas, F_2?

A. 1.76×10^{23} atoms
B. 6.02×10^{22} atoms
C. 1.99×10^{23} atoms
D. 8.87×10^{22} atoms

20. For which of the following compounds is its molecular formula identical to its empirical formula?

A. N_2H_2
B. H_2O
C. C_6H_6
D. $C_6H_{12}O_6$

21. Which of the following is a molecular compound?

A. NaBr
B. CH_2O
C. Na_2CO_3
D. Br_2

22. What is the correct formula for sodium sulfide?

A. Na_2S
B. NaS
C. Na_2SO_4
D. $NaSO_4$

23. What is the correct name of N_2O_5?

A. nitrogen pentaoxide
B. dinitrogen pentoxide
C. nitrogen(V) oxide
D. dinitrogen oxide

24. What is the molar mass of dinitrogen trioxide?

A. 30.01 g/mol
B. 92.01 g/mol
C. 76.01 g/mol
D. 44.02 g/mol

25. How many moles of oxygen atoms are in 25.7 g of $CaSO_4$?

A. 0.189 mol
B. 4.00 mol
C. 1.03 mol
D. 0.755 mol

26. What is the mass percent of iron in iron(II) oxalate, FeC_2O_4?

A. 32.07%
B. 38.82%
C. 61.18%
D. 14.29%

27. A compound has a composition by mass of 85.6% C and 14.4% H. Which of the following could be the molecular formula of this compound?

A. C_2H_4
B. CH_4
C. C_3H_4
D. C_2H_6

28. What is the coefficient of H_2O when the following equation is properly balanced with the smallest set of whole number coefficients?

___ Al_4C_3 + ___ H_2O → ___ $Al(OH)_3$ + ___ CH_4

A. 4
B. 6
C. 12
D. 24

29. Find the number of atoms in 1.00 pound of pure carbon. (1 pound = 453.59 grams)

A. 6.02×10^{23}
B. 2.27×10^{25}
C. 4.40×10^{-26}
D. 5.01×10^{22}

30. What is the mass in grams of Avogadro's number of amu?

A. 1 g
B. 12 g
C. 6.02×10^{22} g
D. 1.66×10^{-24} g

CHE 105 SP 2011 Exam 1 key

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