Sample Placement Exam for Chemistry 200

The Placement Exam contains 44 multiple-choice questions. You will be allowed 45 minutes to do the exam. A good workbook for reviewing for the test is "Schaum's Easy Outlines, Beginning Chemistry". Silent, non-printing, non-programmable calculators will be permitted; Personal Digital Assistants will not be permitted. Your score will be the total of correct answers. A periodic table and other useful information will be provided on the back page. Scratch paper will also be provided.

The exam covers the following topics in chemistry and mathematics at the high school level.
Elements and Atoms: basic properties, atomic number, atomic mass, isotopes, Lewis symbols, valence electrons, electronic configurations, use of the periodic table
Compounds and Molecules: physical properties, molecular mass, naming inorganic compounds, formula calculations, simple Lewis dot structures
Reactions: Balancing equations, simple stoichiometry, equilibria, enthalpy, entropy, simple kinetics
Bonding: Ionic, covalent, metallic
Gases: Use of the ideal gas law
Solutions: Molarity, dilution, basic ideas of acids and bases, properties of electrolytes
Mathematics: significant figures, simple algebra

The following twelve questions are examples of the types of questions that may be asked, but note that they do not cover all of the material that may be on the exam.

Circle the *one* best answer for each of the following questions.

1. What is the molar mass (molecular weight) of the compound Al_2O_3?

   A. 21.00 B. 42.98
   C. 50.00 D. 101.96

2. The density of ethanol is 0.789 g/cm^3. How many grams are there in 205 milliliters of ethanol?

   A. 162 B. 205
   C. 260 D. 2.60×10^3

3. Which chemical equation below is *balanced*?

   A. $2\ N_2(g) + 3\ H_2(g) \rightarrow 2\ NH_3(g)$ B. $2\ Mg(s) + O_2(g) \rightarrow 2\ MgO(s)$
   C. $2\ Al(s) + 3\ O_2(g) \rightarrow Al_2O_3(s)$ D. $Ca[OH]_2(s) + CO_2(g) \rightarrow Ca[HCO_3]_2(s)$

4. How many grams of sugar are in six dozen doughnuts if each doughnut contains 75 g of sugar?

   A. 0.96 B. 450
   C. 900 D. 5400

5. Instructions in a laboratory manual say to "add a small amount of chloride ion" to an aqueous solution. Which of the following reagents should you use?

   A. $Cl_2(g)$
   B. NaCl
   C. $Na[ClO_4]$
   D. Any of these reagents would work.

6. How many moles of water (H_2O) would be produced if 10 moles of O_2 gas reacted completely with excess H_2 gas?

$$2\ H_2(g) + O_2(g) \rightarrow 2\ H_2O(g)$$

   A. 5
   B. 10
   C. 20
   D. 30

7. Heat is *released* when H_2 gas and O_2 gas react to form H_2O. Why?

   A. Breaking the H–H bond in H_2 gas releases heat.
   B. Breaking the O–O bond in O_2 gas releases heat.
   C. Forming the H–O bonds in H_2O releases heat.
   D. Both A and B are responsible for heat being released in the reaction.

8. If the pressure of an ideal gas is *increased*, what will happen to the volume of the gas? Assume all other variables remain constant.

   A. It is impossible to predict the change in volume of the gas.
   B. The volume of gas will increase.
   C. The volume of gas will decrease.
   D. The volume of gas will stay the same.

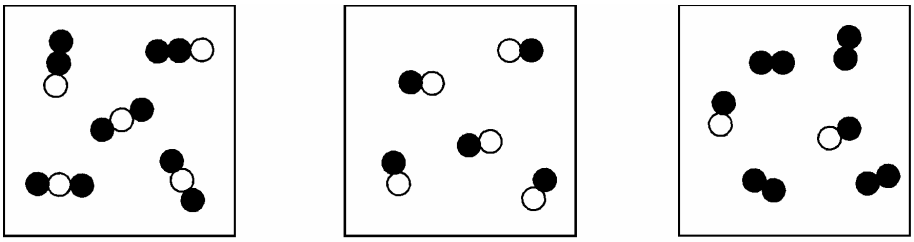
9. Which chemical equation *best* describes the reaction of potassium metal with fluorine gas to form solid potassium fluoride?

   A. $K(s) + F_2(g) \rightarrow KF_2(s)$
   B. $K(s) + F(g) \rightarrow KF(s)$
   C. $K_2(g) + F_2(g) \rightarrow 2\ KF(s)$
   D. $2\ K(s) + F_2(g) \rightarrow 2\ KF(s)$

10. How many valence electrons does a neutral atom of carbon have?

    A. 0
    B. 2
    C. 4
    D. 6

11. Which diagram(s) could represent a *pure compound*?



I **II** **III**

A. I
B. II
C. III
D. None of the diagrams represent a pure compound.

12. When salt water is allowed to evaporate in an open container, what happens to the concentration of salt in the water?

A. It remains constant throughout the process.
B. It increases or decreases depending on the temperature of the water.
C. It decreases.
D. It increases.