

Sample Questions for the Chemistry Placement Exam

Note: These questions are intended to represent the general level of difficulty and areas of coverage of the Chemistry Placement Exam.

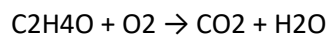
They are NOT intended to be a complete representation of the specific types of questions to be found on the exam.

1. Aluminum reacts with element X to form a compound with the formula Al_2X_3 . Element X exists as diatomic molecules, X_2 , in the gaseous state at normal temperature and pressure. Element X must be:

- a) Nitrogen
- b) Oxygen
- c) Sulfur
- d) Chlorine

Explanation: Aluminum forms a +3 ion. In order for the formula unit Al_2X_3 to be electrically neutral, the element X must form a -2 ion. Nonmetals in the oxygen column do this. Of these elements, only oxygen is a diatomic gas.

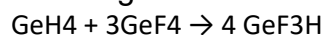
2. What is the coefficient of O_2 when the following equation is balanced?



- a) 2
- b) 3
- c) 4
- d) 5

Explanation: The balanced equation is $2 C_2H_4O + 5 O_2 \rightarrow 4 CO_2 + 4 H_2O$

3. How many moles of GeH_4 are needed to form 8.00 moles of GeF_3H according to the following reaction?



- a) 2.00
- b) 4.00
- c) 8.00
- d) 16.00

Explanation: $8.00 \text{ mol } GeF_3H (1 \text{ mol } GeH_4 / 4 \text{ mol } GeF_3H) = 2.00 \text{ mol } GeH_4$

4. According to its location in the periodic table, the element bromine (element # 35) is best described as:

- a) A metal
- b) A nonmetal
- c) A transition metal
- d) A metalloid

Explanation: Nonmetals are toward the upper right of the periodic table. All the elements in the fluorine column are nonmetals.

5. Which of the following species is neither acidic nor basic when dissolved in water?

a) HCl

b) NH₃

c) NaCl

d) NaHCO₃

Explanation: HCl, hydrochloric acid, is a strong acid. NH₃, ammonia, is a weak base. In a solution of NaHCO₃, sodium hydrogen carbonate (baking soda), the hydrogen carbonate ion, HCO₃⁻, acts as a base. Neither the sodium ion Na⁺, nor the chloride ion, Cl⁻, which form when NaCl is dissolved in water, has significant acidic or basic properties.

6. To the correct number of significant figures, the result of the following calculation $[(11.13 - 2.6) \times 10^4] / [103.15 \times 10^{-6}]$ should be reported as:

a) 8.27×10^8

b) 8.3×10^{-4}

c) 8.3×10^8

d) 8.27×10^{-8}

Explanation: The "calculator answer" is $8.2695\dots \times 10^8$. When the numbers in the numerator are subtracted the result, 8.53, must be rounded to one decimal place, or 8.5. Since this number has two significant figures, the result when it is divided by a number with 5 significant figures is limited to two significant figures.