Topics 1.1 – 1.3: MCQ Practice

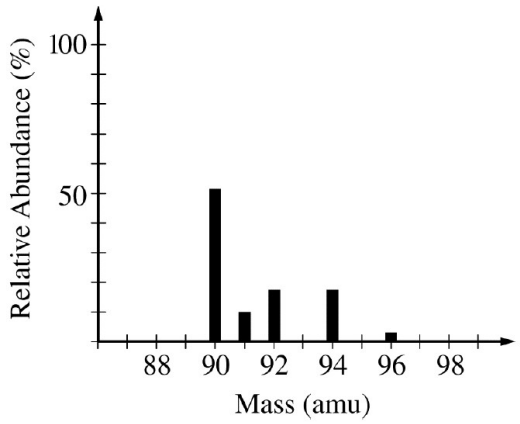
1. Which of the following contains the greatest mass of oxygen?

   (A) 1.00 g Na_2O

   (B) 1.00 g MgO

   (C) 1.00 g K_2O

   (D) 1.00 g CaO



2. The mass spectrum of element X is presented in the diagram above. Based on the spectrum, which of the following can be concluded about element X?

   (A) X is a transition metal, and each peak represents an oxidation state of the metal.

   (B) X contains five electron sublevels.

   (C) The atomic mass of X is 90.

   (D) The atomic mass of X is between 90 and 92.

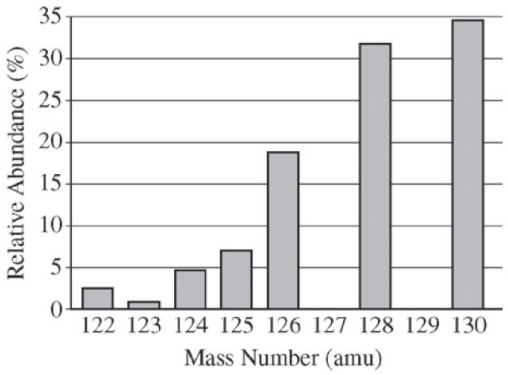
3. A 23.0 g sample of a compound contains 12.0 g of C, 3.0 g of H, and 8.0 g of O. Which of the following is the empirical formula of the compound?

(A) CH_3O

(B) C_2H_3O

(C) C_2H_6O

(D) C_4H_6O



4. The elements I and Te have similar average atomic masses. A sample that was believed to be a mixture of I and Te was run through a mass spectrometer, resulting in the data above. All of the following statements are true. Which one would be the best basis for concluding that the sample was pure Te?

(A) Te forms ions with a –2 charge, whereas I forms ions with a –1 charge.

(B) Te is more abundant than I in the universe.

(C) I consists of only one naturally occurring isotope with 74 neutrons, whereas Te has more than one isotope.

(D) I has a higher first ionization energy than Te does.

5. A sample of a compound that contains only the elements C, H, and N is completely burned in O_2 to produce 44.0 g of CO_2, 45.0 g of H_2O, and some NO_2. A possible empirical formula of the compound is

(A) CH_2N

(B) CH_5N

(C) C_2H_5N

(D) $C_3H_3N_2$

6. M^+ is an unknown metal cation with a +1 charge. A student dissolves the chloride of the unknown metal, MCl, in enough water to make 100.0 mL of solution. The student then mixes the solution with excess $AgNO_3$ solution, causing AgCl to precipitate. The student collects the precipitate by filtration, dries it, and records the data shown below. (The molar mass of AgCl is 143 g/mol.)

Mass of unknown chloride, MCl	0.74 g
Mass of filter paper	0.80 g
Mass of filter paper plus AgCl precipitate	2.23 g

What is the identity of the metal chloride?

(A) NaCl

(B) KCl

(C) CuCl

(D) LiCl

7. Complete combustion of a sample of a hydrocarbon in excess oxygen produces equimolar quantities of carbon dioxide and water. Which of the following could be the molecular formula of the compound?

(A) C_2H_2

(B) C_2H_6

(C) C_4H_8

(D) C_6H_6

8. After completing an experiment to determine gravimetrically the percentage of water in a hydrate, a student reported a value of 38 percent. The correct value for the percentage of water in the hydrate is 51 percent. Which of the following is the most likely explanation for this difference?

(A) The anhydrous salt had absorbed moisture from the air before its mass was recorded.

(B) Strong initial heating of the solid hydrate caused some of the sample to spatter out of the crucible.

(C) The crucible had not been heated to constant mass before it was used in the experiment.

(D) Excessive heating caused the anhydrous salt to undergo a decomposition reaction.