

## AP Chemistry Level 1.2-1.5 Practice Problems

Level 1.2: Calculate the number of grams in  $9.7 \times 10^{22}$  molecules of ethanol,  $\text{CH}_3\text{CH}_2\text{OH}$ . (7.4 g ethanol)

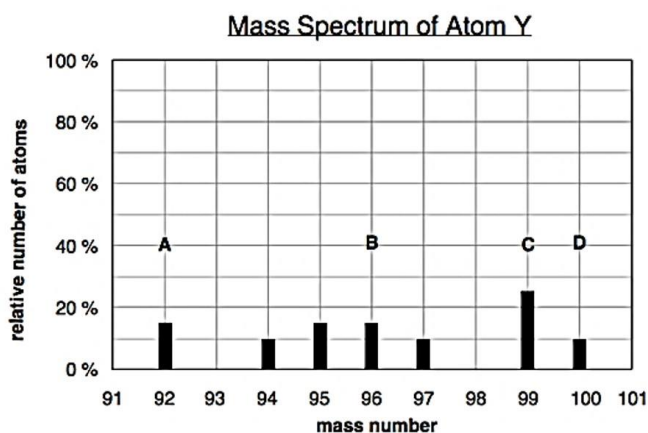
Level 1.3.1: Find the percentage composition of a compound formed when 0.4 moles of potassium are reacted with 8.96 liters of  $\text{O}_2$  gas and  $2.41 \times 10^{22}$  atoms of S. (K= 15.64g; O= 12.8g; S= 1.28g; MM= 29.7g; K = 52.66%; O= 43.10%; S= 4.310%)

Level 1.3.2: Many salts are hydrated, which means they have water molecules incorporated into their ionic crystal lattice in a fixed ratio. sodium carbonate decahydrate,  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ , has ten water molecules incorporated into the crystal lattice structure. Calculate the percentage of water by mass in this hydrate salt. (63%)

Level 1.4.1: Determine the empirical formula of a compound with 65.2% Sc and 34.8% O ( $\text{Sc}_2\text{O}_3$ )

Level 1.4.2: Determine the molecular formula for a compound that contains 12.2-g Nitrogen, 27.8-g Oxygen, and a molecular mass of 92.0 g/mol. ( $\text{N}_2\text{O}_4$ )

Level 1.5.1: D, B, D



Based on the mass spectrum of atom Y, which of the following statements is false?

- peak A and peak D come from atoms that have the same number of electrons
- there are seven isotopes of atom Y
- peak C comes from the most abundant isotope of atom Y
- peak D comes from an atom with 4 more protons than the atom that gave peak B

The identity of compound Y is:

- |               |                |
|---------------|----------------|
| a. zirconium  | c. americium   |
| b. molybdenum | d. einsteinium |

Which peak comes from an atom with the greatest number of neutrons?

- |   |      |
|---|------|
| a. A  | c. C |
| b. all peaks in the spectrum have the same number of neutrons | d. D |

Level 1.5.2: A laboratory uses mass spectrometry to find four isotopes of iron below but does not know the exact mass of the last isotope. Using the known mass on the periodic table, what is the mass of the last isotope?

Iron – 56 (91.75%); Iron – 58 (0.28%); Iron – 57 (2.12%); Iron - ??? (5.85%)

(53)