

Prelab Questions--Experiment 1: Synthesis of a Cr(III) Complex and Mass Spectrometry

Answer **two** (2) of the following questions, based on the last digit of your student ID number.
ID ending in: 0 or 1: a&b 2 or 3: c&d 4 or 5: e&f 6 or 7: g&h 8: i&j 9: k&l

a. The literature value of the MH^+ monoisotopic parent peak for camphor (in sports rubs) is 153.1279 amu. The experimental value for the peak is 153.1265 amu. Calculate the error in parts per million (ppm) = (error/theoretical)* 1×10^6 ppm.

b. (True/False) Urea when heated produces ammonia, NH_3 , which is acidic.

c. Calculate the averaged atomic mass of Li from the abundances in Table 1. Show your work.

d. (True/False) For samples containing C, H, N and O (no metal), the MH^{+2} peak results primarily from the substitution of ^{18}O atoms for ^{16}O atoms.

e. The literature value of the MH^+ monoisotopic parent peak for caffeine is 195.0882 amu. The experimental value for the peak is 195.0896 amu. Calculate the error in parts per million (ppm) = (error/theoretical)* 1×10^6 ppm.

f. (True/False) Since all the ions, for a given charge, have the same kinetic energy, heavy ions travel slowly and light ions travel rapidly.

g. Calculate the averaged atomic mass of Si from the abundances in Table 1. Show your work.

h. Calculate the monoisotopic mass of $Cr(acac)_3H^+$ for the most abundant isotope of Cr. Show your work.

i. The literature value of the MH^+ monoisotopic parent peak for pyridoxine is 169.0739 amu. The experimental value for the peak is 169.0725 amu. Calculate the error in parts per million (ppm) = (error/theoretical)* 1×10^6 ppm.

j. (True/False) The mass of 1H is 1.0000 amu, since the nucleus contains just one proton.

k. Calculate the averaged atomic mass of Mg from the abundances in Table 1. Show your work.

l. The mass analyzer for this experiment is based on: (a). the deflection of the flight path of the ion in a magnetic field, (b). the time for the ion to travel from the source to the detector, (c). the deflection of the flight path of the ion in an electric field, (d). the frequency of the circular orbit of the ion.

* The student ID number is the 6-digit number on the front of your ID card at the right-hand side