

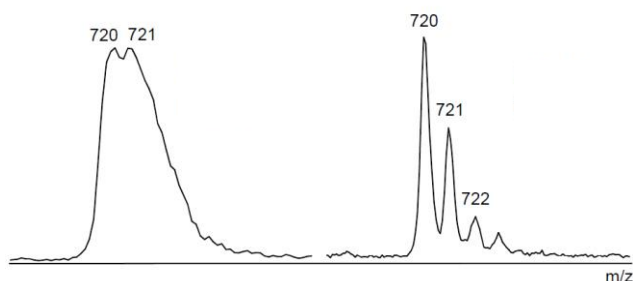
Structural analysis (CH-314)

Week 3

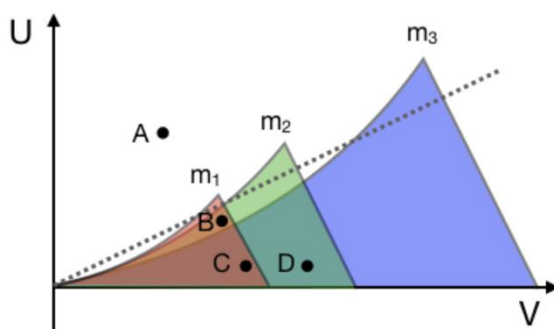
Problems

Problem 1. Consider a time-of-flight (TOF) mass spectrometer in which ions are accelerated by 10 kV into a two-meter drift tube. Calculate the flight time of the fullerene molecular ion, C_{60}^{+} .

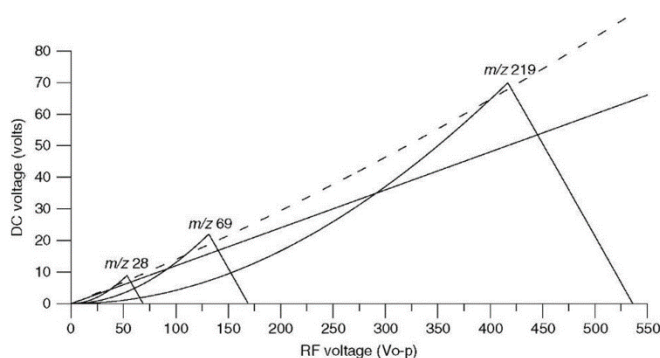
Problem 2. Shown below are the mass spectra of the fullerene molecular ion recorded on a linear TOF mass spectrometer and on a TOF with reflectron. Assuming the path length of the ions in both instruments are the same, which of the two spectra, do you think, was recorded on the instrument with reflectron?



Problem 3. Consider the figure below representing the quadrupole stability diagram for three ions of mass-to-charge ratios m_1 , m_2 , and m_3 . Explain which ions will be transmitted through the quadrupole when the U and V voltages are set to those represented by the points A-D in the figure.



Problem 4. Consider the figure below representing the quadrupole stability diagram with two scan lines, solid and dashed. Which of the two lines, do you think, corresponds to a higher quadrupole resolution?



Problem 5. Find the cyclotron frequency (in Hz) of ions with $m/z = 500$ Th in a 12 Tesla ion cyclotron resonance (ICR) mass spectrometer.