Chemistry 416, Dr. Glaser

Applications of Mass Spectroscopy: Double Focusing MS.

Double-focusing mass spectroscopy is increasingly important and we should make sure we understand what that means. In the figure, the paths are shown for two beams that (a) start in two different directions and (b) contain ions with the same mass but different energies. In the end, all the ions with the same mass (and despite different initial direction and kinetic energy) come to the same point. How does this "miracle" happen?

Explain first, what happens to the ions with the same initial direction but different energy. Then consider the difference between two ions with different initial direction but the same energy. Then explain why we get energy-resolved peaks between the two focusing devices.

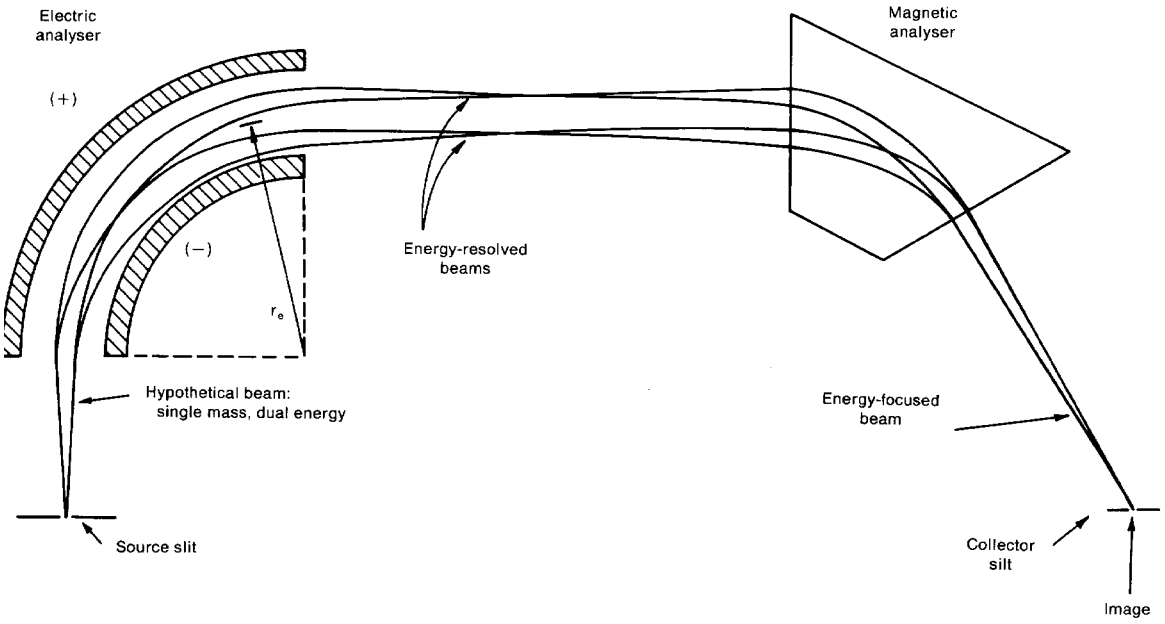

Figure 6.2. Nier-Johnson double-focusing mass spectrometer. The two sets of ion paths illustrate focusing for dispersion and for ion kinetic energy (shown in exaggerated form; Ligon 1979). Modern commercial instruments give a resolving power of 10^4–10^5 and mass measuring accuracy of 2–5 ppm.