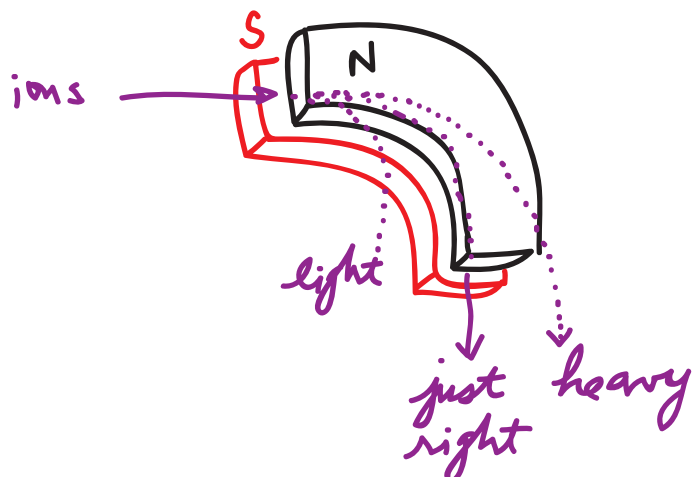


Welcome to module #1 for Mass Spectrometry

Review

3 basic parts of MS

- (a) ion source
- ⇒ (b) mass selector = mass analyzer
- (c) detector



Quadrupole MS - replace sector magnet w/ quadrupole

- most common MS
- compact
- fast scan rates (3-10 scans/sec)
- high transmission coefficients
- modest vacuum requirements (10^{-4} - 10^{-5} torr)
- limitation - lower peak resolution
 - smaller range of masses 10-1000 amu

So... how does it work?

Finally, a word about scan rates

The $V_{DC} + V_{RF}$ are scanned at a rate that covers about 4,000 amu every second

That means our instrument scans 0-1,000 amu in about 250 ms

Typically most of our molecules are small, MW < 500 amu

We can scan 0-500 amu in about 125 ms

Therefore Quad MS can be used to monitor material coming off a gas chromatograph (GC)

Summary of Quadrupole MS

1. compact
2. relatively inexpensive
3. modest vacuum requirements about 10^{-1} - 10^{-2} torr
4. fast scan rates about 125 ms
5. resolution is low about 1 amu
6. maximum $m/z \sim 1,000$ amu - that means large biomolecules can not be separated in a quadrupole mass spec

Please read pp. 450-451 in your text (Granger)

Here's a URL with nice explanation and animation

https://www.youtube.com/watch?v=6_mavZ_WKoU