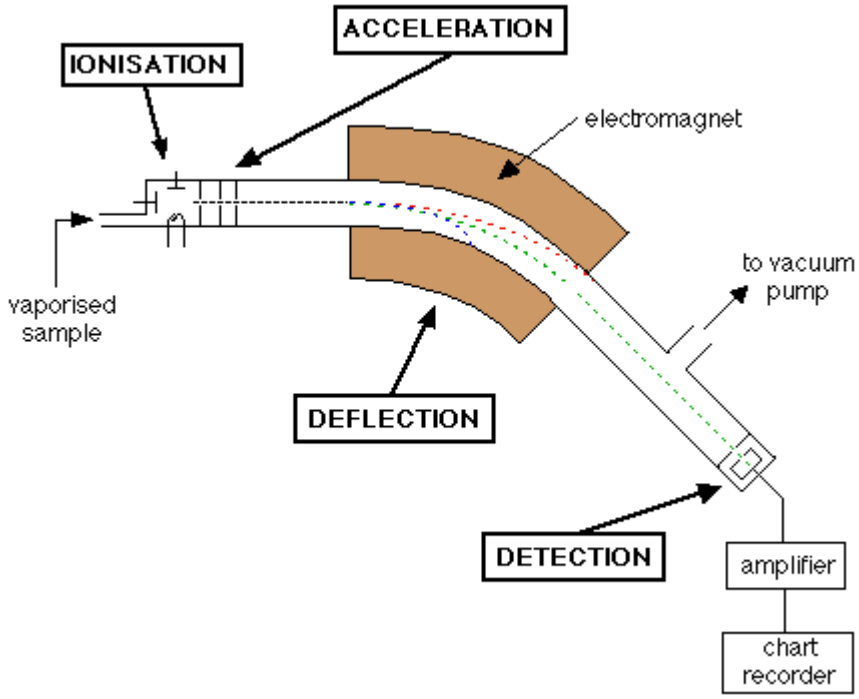
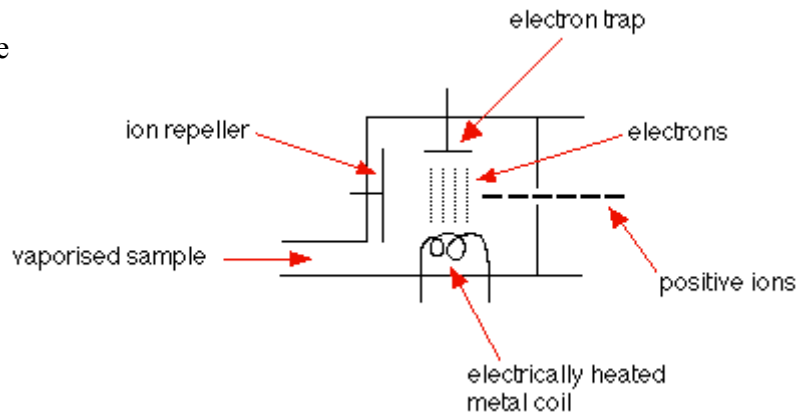
THE MASS SPECTROMETER

1. The diagram, taken from the Chemguide page, shows the main parts of a mass spectrometer.



a) Explain what is happening in the ionisation part of the spectrometer which looks like this in close-up:



b) How are the ions produced in the ionisation chamber accelerated?

c) (i) What two properties of the ions determine how much they are deflected by the magnetic field? What effect does each of these properties have on the amount of deflection?

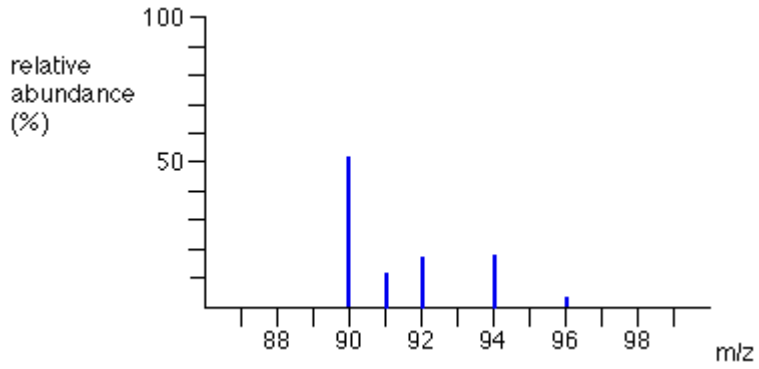
(ii) Of the three different ion streams in the diagram above, why is the red one least deflected?

(iii) What would you have to do to focus the red stream on the detector?

d) Why is it important that there is a vacuum in the instrument?

e) Describe briefly how the detector works.

2. The mass spectrum of zirconium looks like this:



a) What does m/z mean?

b) Explain as fully as possible what the mass spectrum shows about zirconium. (I am not expecting you to read actual values from the relative abundance axis.)

c) The spectrum shows lines for 1+ ions. If there were also peaks for 2+ ions, where would you expect to find them, and what would you predict about their heights relative to the 1+ peaks?