1) Consider the mass spectrum below of formic acid (46 g/mol).
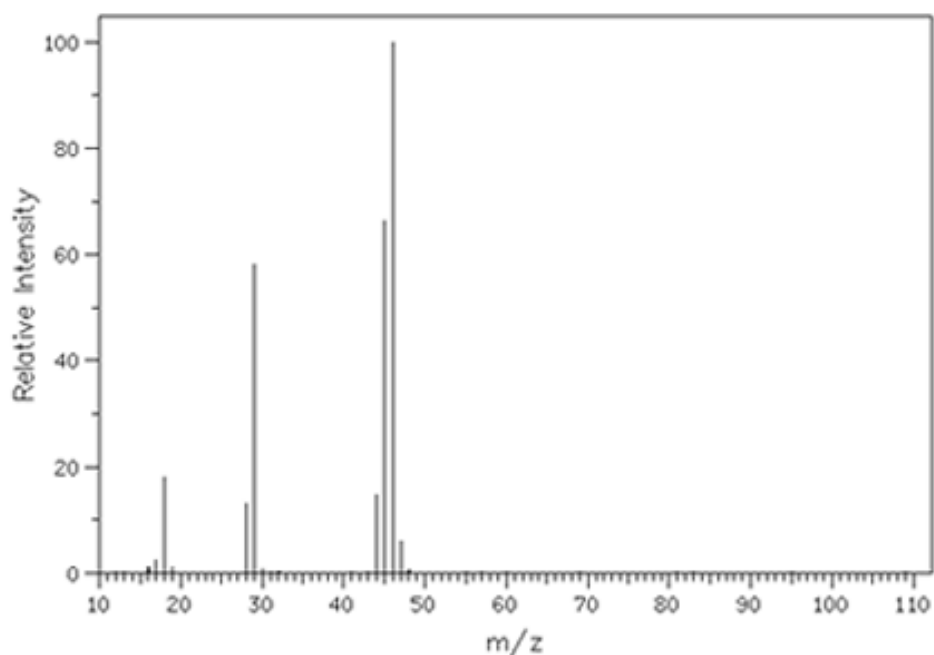
i) What is the m/z value of the parent ion peak? *46*

ii) What is the base peak. *It is the tallest peak in the spectrum. It is set at 100% and all other peaks are measured relative to this. In this case it is at m/z 46. In this case it happens to be the same as the parent ion peak, but this is not always the case.*

iii) What is the peak at 47 m/z due to?

This due to the presence of ^{13}C isotope.
iv) What fragment forms the peak at 29 (M/z) ?
HCO^+

2) The separation and identification of proteins is crucial to the identification of a particular disease.
   Which of the following sequence of techniques could be used to
        i. separate these molecules, then
        ii. accurately determine their molecular mass, and then
   **iii.** determine their molecular structure.
        A. NMR spectroscopy, followed by mass spectrometry, followed by high-performance liquid chromatography
        B. high-performance liquid chromatography, followed by mass spectrometry, followed by NMR spectroscopy
        C. high-performance liquid chromatography, followed by infrared spectroscopy, followed by mass spectrometry
        D. mass spectrometry, followed by high-performance liquid chromatography, followed by infrared

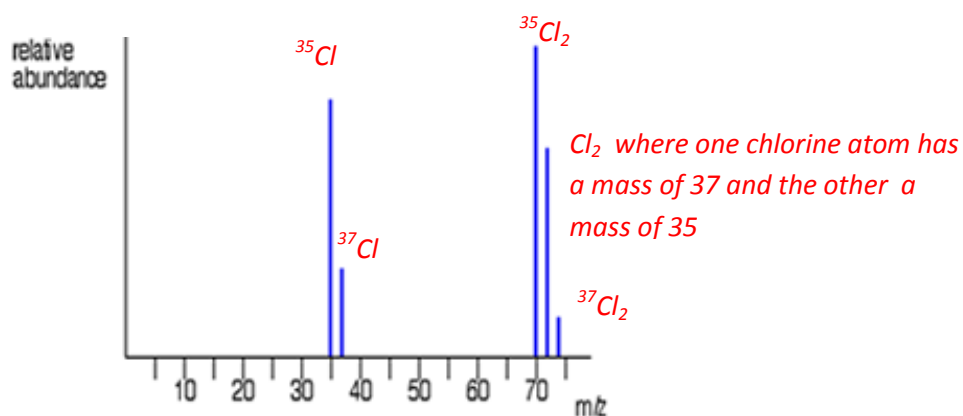3) A sample of pure zirconium was analysed in a mass spectrometer. The following spectrum was obtained.
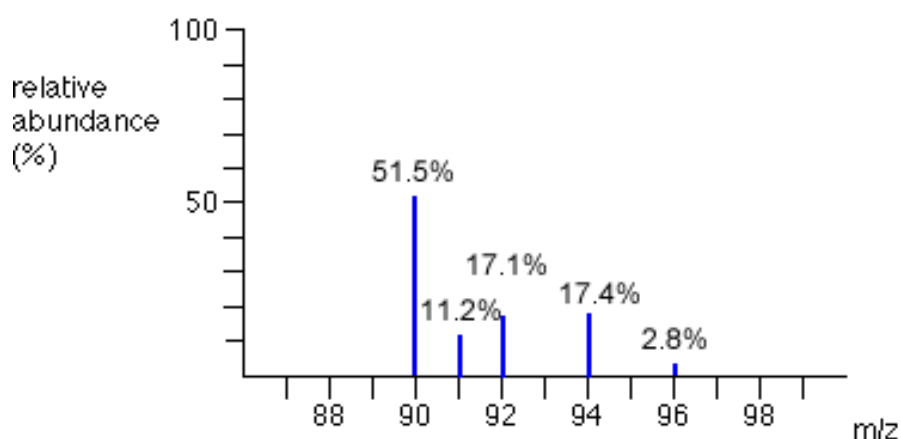
a) How many different isotopes are present in a sample of zirconium?
   5
b) Calculate the relative atomic mass of zirconium.
   (90 X 51.5 + 91 X 11.2 + 92 X 17.1 + 94 X 17.4 + 96 X 2.8)/100 = 91.3

4) Below is the mass spectrum of chlorine

Cl_2 where one chlorine atom has a mass of 37 and the other a mass of 35

a) Explain why there are two separate groups of peaks.
   One set for the chlorine atoms and the other for the Cl_2 molecules

b) State what causes each of the 5 lines.

c) What can be deduced from the heights of the lines at m/z 35 and 37?

   The relative abundance of the ^{35}Cl and the ^{37}Cl