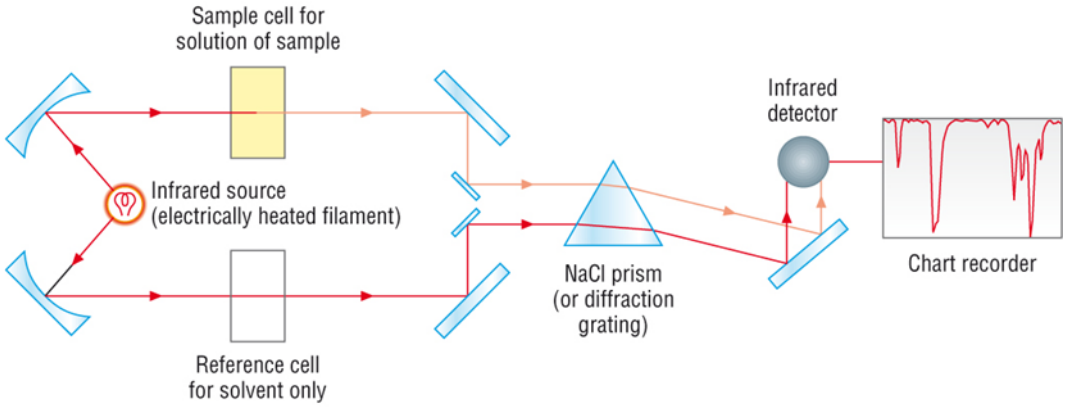
Organic analysis knowledge organiser

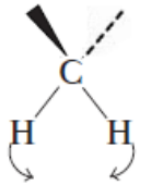
1. Technique.

- Infrared depends on the fact that infrared radiation is absorbed by certain molecular bonds and this causes them to vibrate.
- There are three types of vibrations, symmetrical, asymmetrical and bending.
- Different bonds absorb IR radiation at different wavelengths and can be used to identify different functional groups.

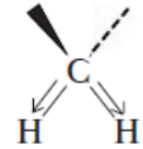
- The finger print region is in the range 1500–500cm-1 is unique for any given compound but is too complicated to analyse.
- Because the finger print region is unique, compounds can be identified by comparing it to a data base of known IR spectra.

- IR is limited as technique because it only gives information about functional groups. Other evidence is required to determine the precise structural formula.

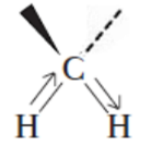




Bending



Symmetrical

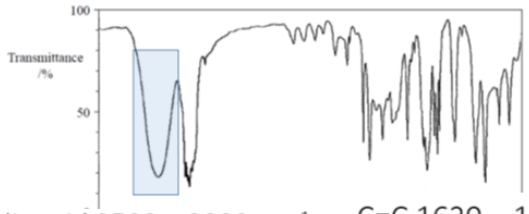


asymmetrical

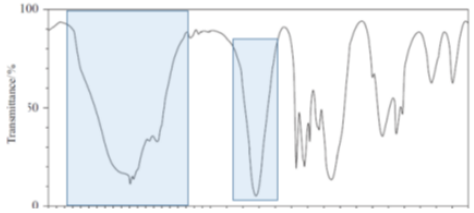
Infrared absorption data

Bond	Wavenumber /cm^{-1}
N—H (amines)	3300 – 3500
O—H (alcohols)	3230 – 3550
C—H	2850 – 3300
O—H (acids)	2500 – 3000
C≡N	2220 – 2260
C=O	1680 – 1750
C=C	1620 – 1680
C—O	1000 – 1300
C—C	750 – 1100

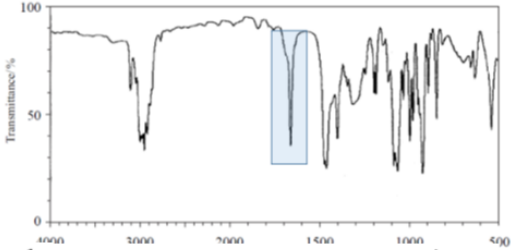
OH Alcohols 3230 – 3550 cm^{-1}



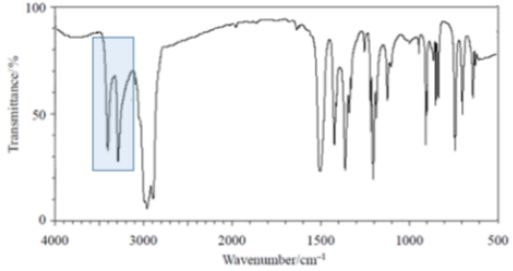
OH carboxylic acid 2500 – 3000 cm^{-1}
C=O 1680 – 1750 cm^{-1}



C=C 1620 – 1680 cm^{-1}



N-H amines 3300 – 3500 cm^{-1}



CH Alkane 2850 – 3330 cm^{-1}