

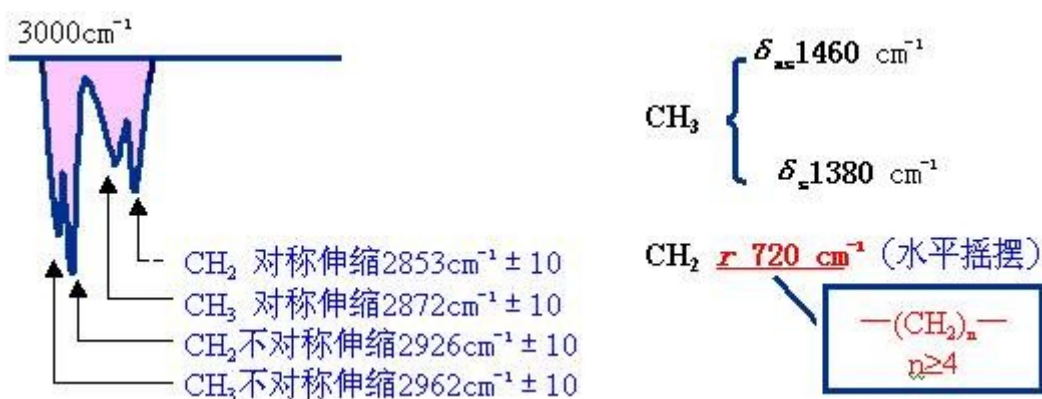
## §8.4.1 Alkane Analysis of IR Spectrograph

The IR spectroscopy of alkane is relatively simple.

Only 3 structure units:  $\text{CH}_3$ ,  $\text{CH}_2$ ,  $\text{CH}$

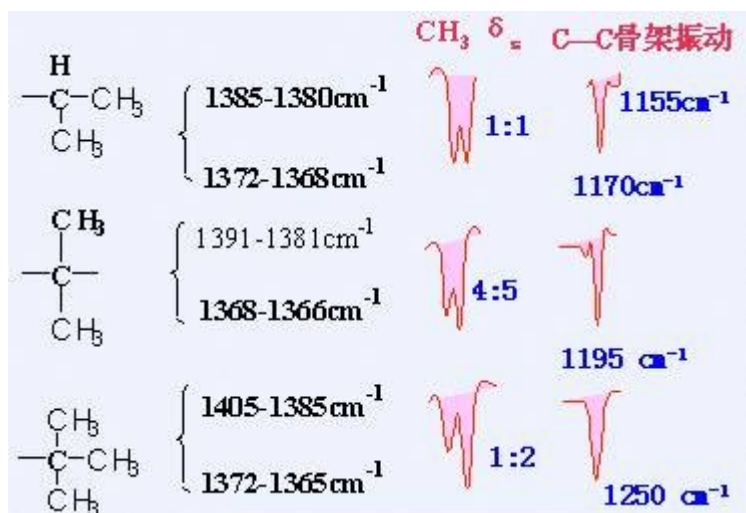
2 types of chemical bonds:  $\text{C}-\text{C}$ ,  $\text{C}-\text{H}$

Its characteristic absorption peaks appear



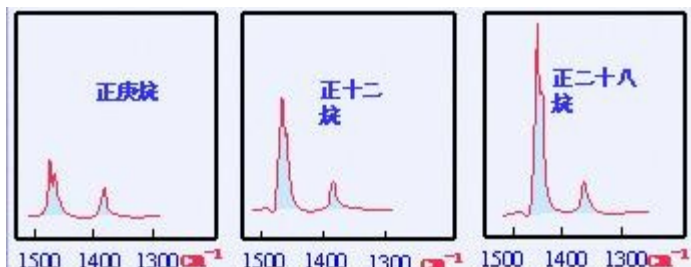
(1) The symmetric deformation vibration of  $\text{CH}_3$  changed for the in draft of branched chains.

(2)  $\text{C}-\text{C}$  skeletal vibration exhibits more distinct.

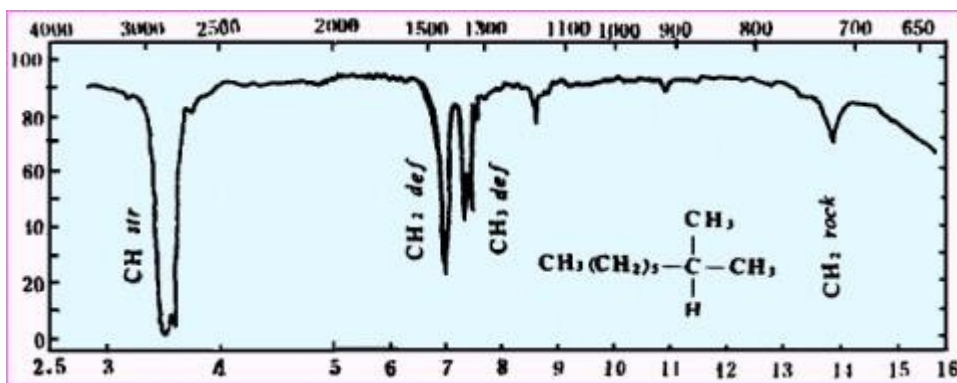


(3) Existence of outplane bending peaks of  $-(CH_2)_n-$  is a sign of long C-C chain.

(4) The relative concentration of  $CH_2$  and  $CH_3$  group can be estimated by the peak intensity at  $1460\text{ cm}^{-1}$  and  $1380\text{ cm}^{-1}$ .



(5) IR spectra of alkanes.



Key points: Application and theory of IR, the vibration equation and calculation, the vibration mode of each functional groups, factors that affect the peak positions.

Questions: There are 4 vibration modes for  $CO_2$  molecule, but why there are only 2 peaks on its IR spectroscopy?