Serie N° 3

Exercise 1

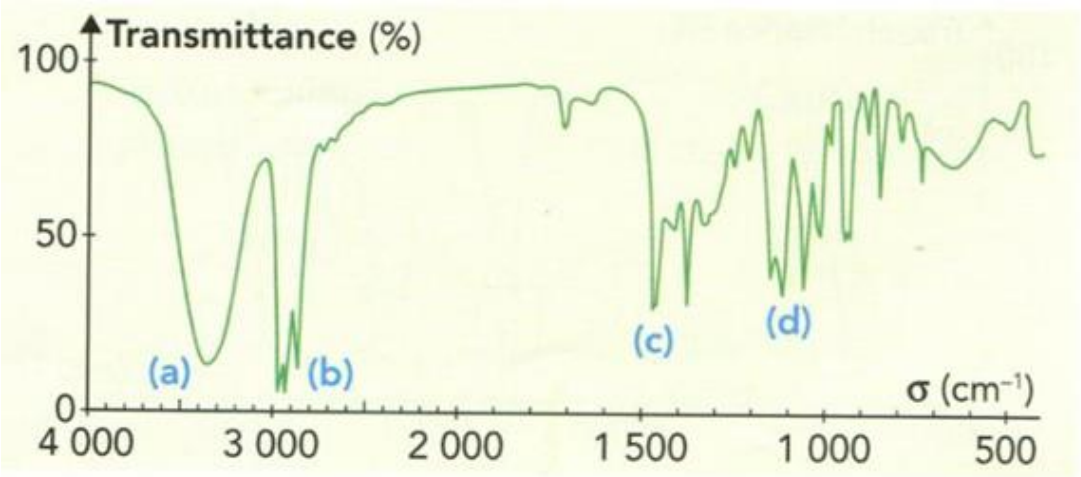
In IR spectroscopy, the vibrational mode of the C=O bond in the molecule $CH_3{-}CO{-}CH_3$ produces a fundamental absorption frequency of $\bar{\nu_0} = 1713\ cm^{-1}$, corresponding to a transition from v = 0 to v = 1.

1- Calculate the force constant **k** for the **C=O** bond by dyne/cm.
2- Compare this value to that of HCl (k_{HCl} = 4.8 x 10^5 dyne/cm) and conclude (we will neglect the effect of CH_3 on the vibrator.

Exercise 2

An excerpt from the IR spectrum of hexan-2-ol is given below.

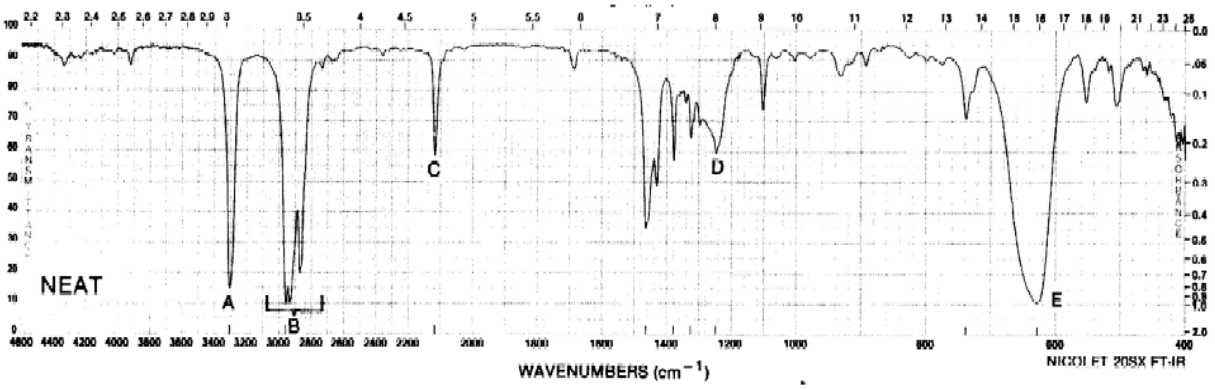
1- Write the semi-developed formula of hexan-2-ol, Deduce the characteristic group and functional group?
2- Identify the absorption bands labeled (a), (b), (c), and (d)?



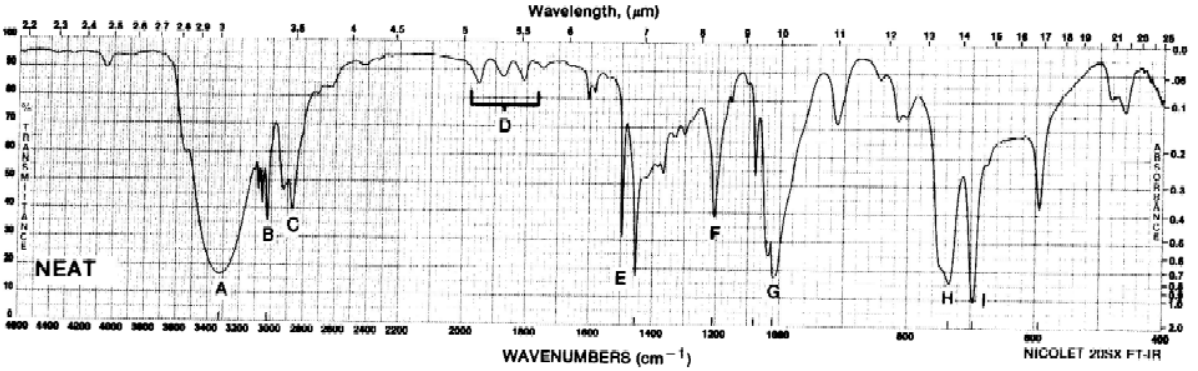
Exercise 3

Consider infrared spectra 1-3 shown below. They each correspond to a compound in the following list: aminobenzene, pentan-2-one, phenylmethanol, methylbenzene, hex-1-yne, phenol.

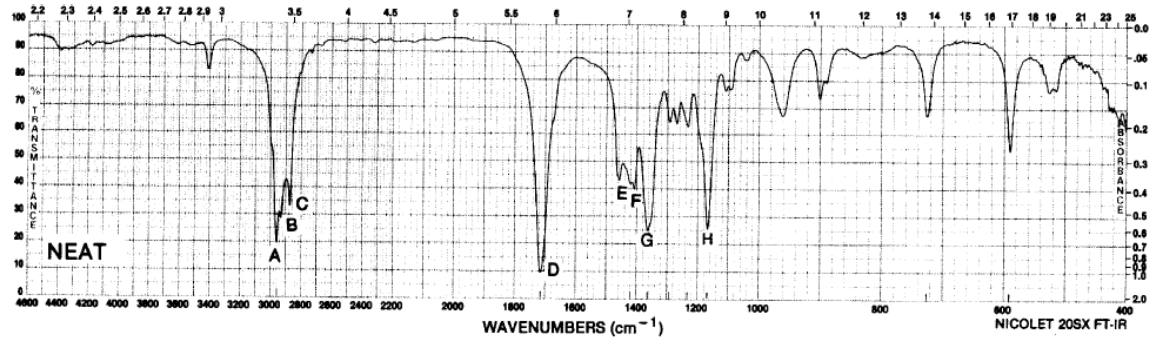
Assign each spectrum the corresponding compound, indexing the most important bands.



Spectre 1



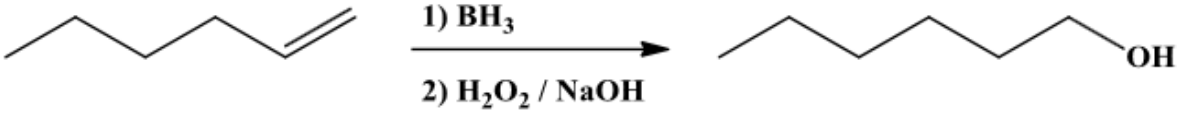
Spectre 2



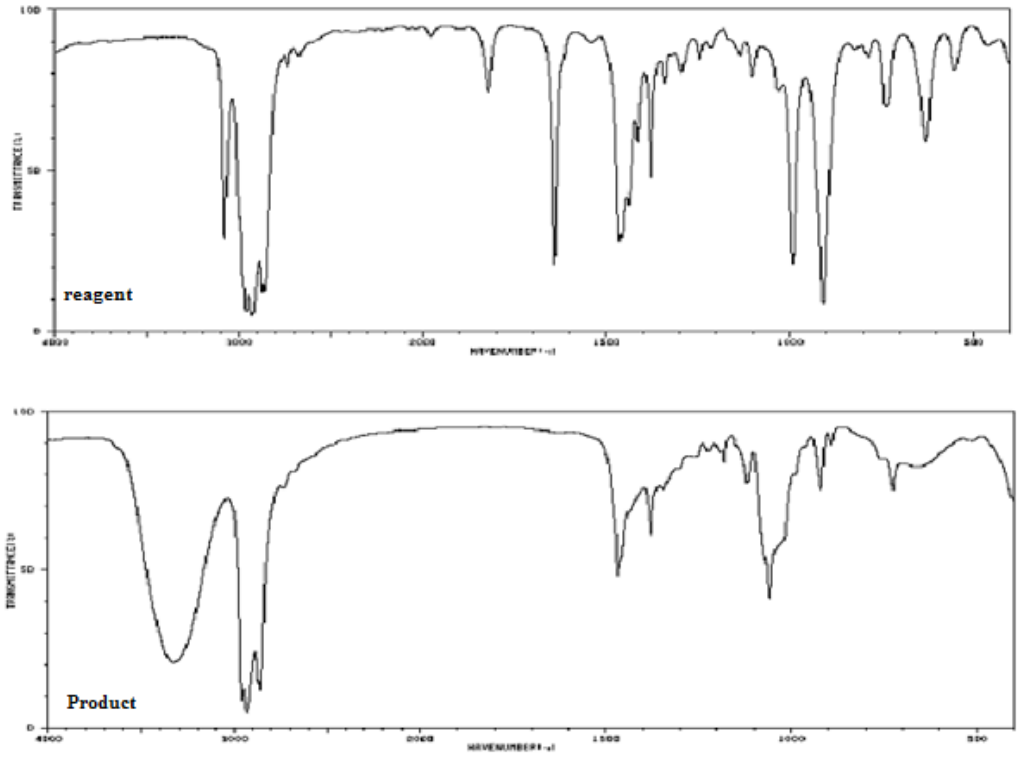
Spectre 3

Exercise 4

The following hydroboration reaction is studied:

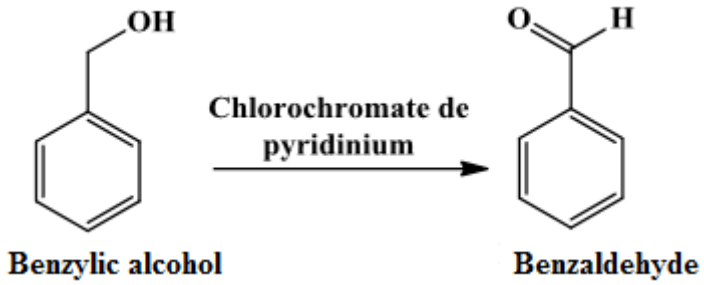


According to the two spectra below, did we obtain the desired product or not, justify your answer?

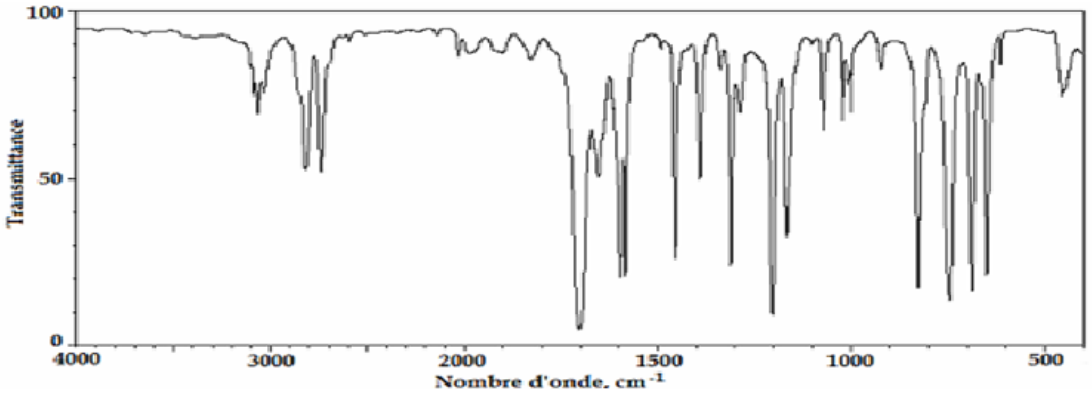


Exercise 5

The oxidation reaction of benzyl alcohol to benzaldehyde is studied:



An unknown product is obtained at the end of the reaction. Its IR spectrum is produced. Not knowing whether the chemical transformation has taken place, indicate by analyzing the IR spectrum whether the product obtained is benzyl alcohol or benzaldehyde.



Exercise 6

Consider the IR spectrum of a compound with the crude formula $C_5H_8O_2$. Assign the bands read and specify a structure compatible with these spectral data.