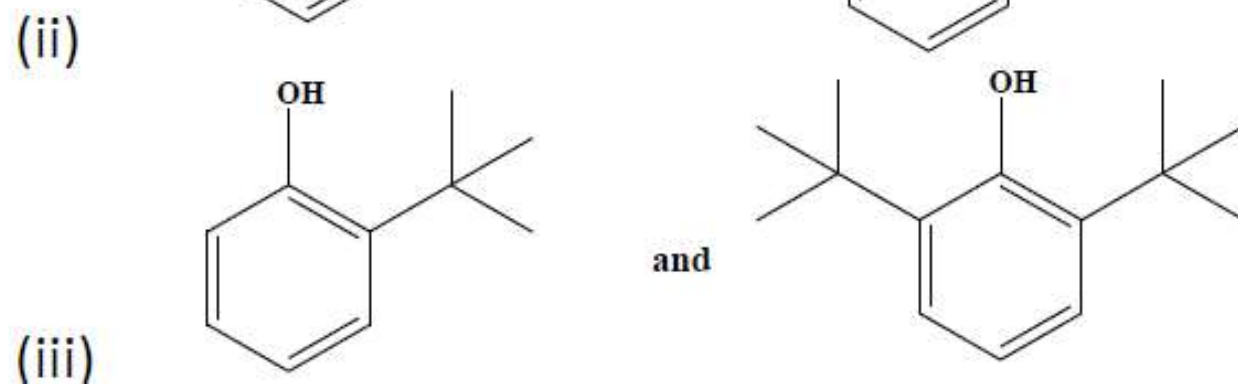
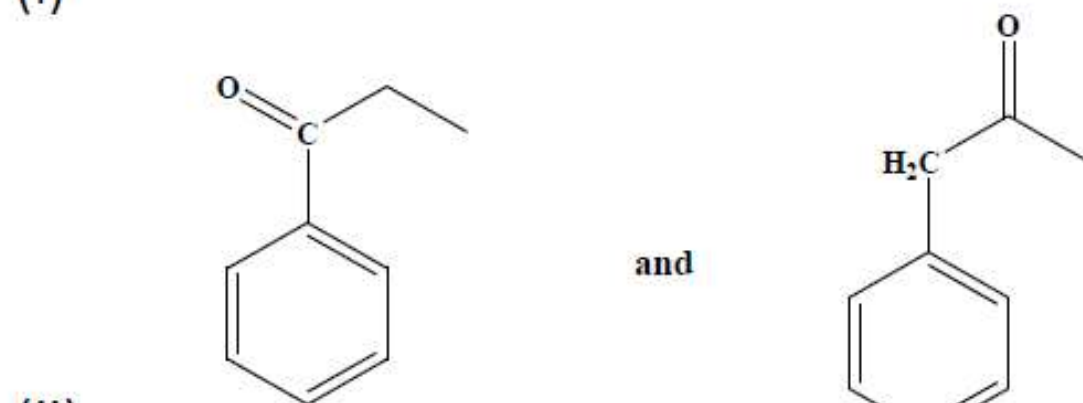
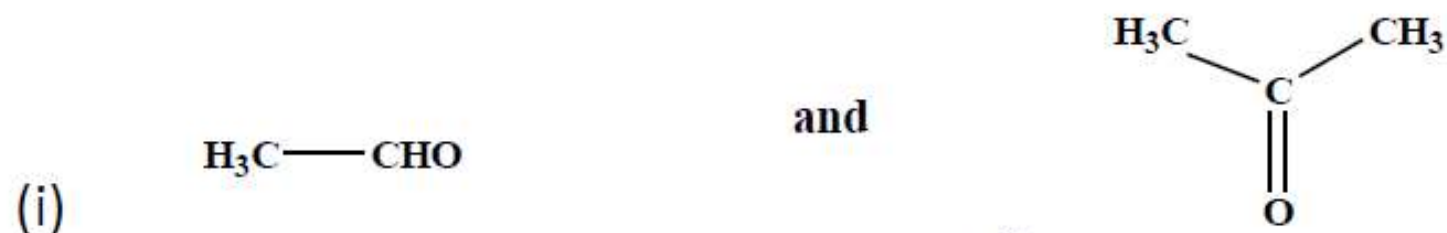


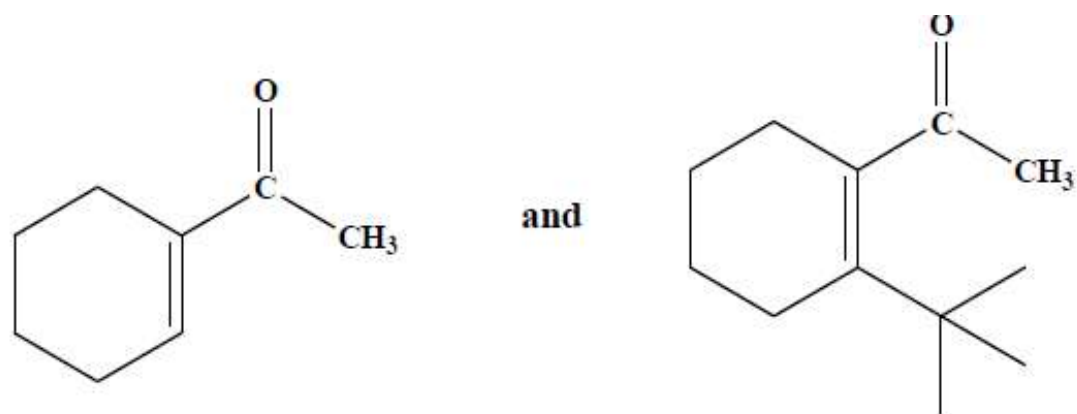
Spectroscopy Tutorial II

1. Calculate the stretching frequency for >C=C< and $\text{—C}\equiv\text{C—}$ in cm^{-1} .
Force constants : (i) $10 \times 10^5 \text{ g s}^{-2}$ (ii) $15 \times 10^5 \text{ g s}^{-2}$
2. The —CH stretching frequency of an alkane is observed at 2900 cm^{-1} . Predict the value corresponding to —CD— frequency. (take the force constant to be same in both the cases)

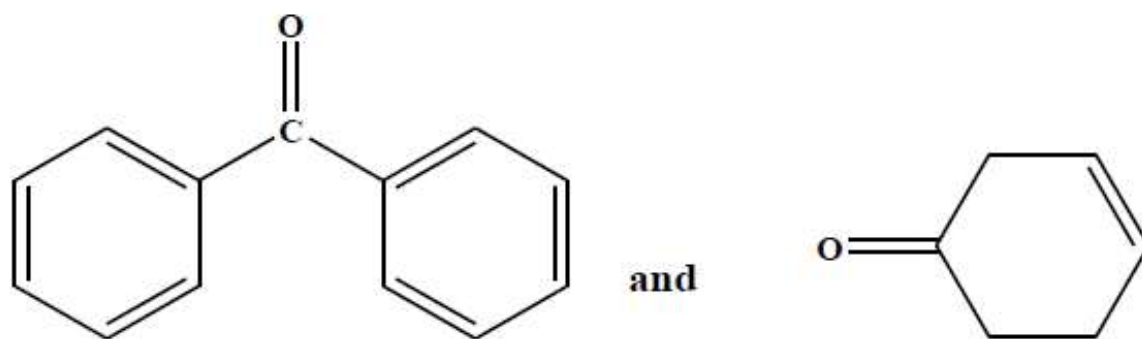
3. Distinguish between the following compounds using IR spectroscopy



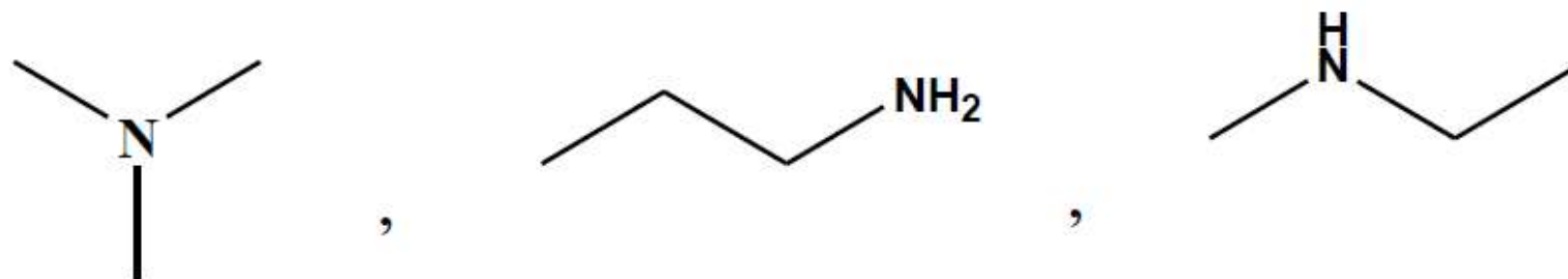
(iv)

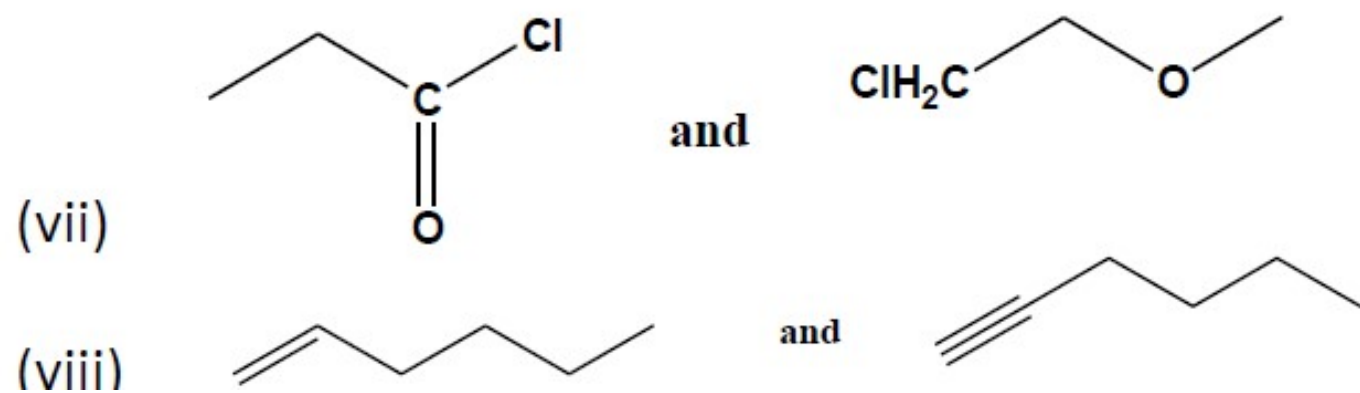


(v)



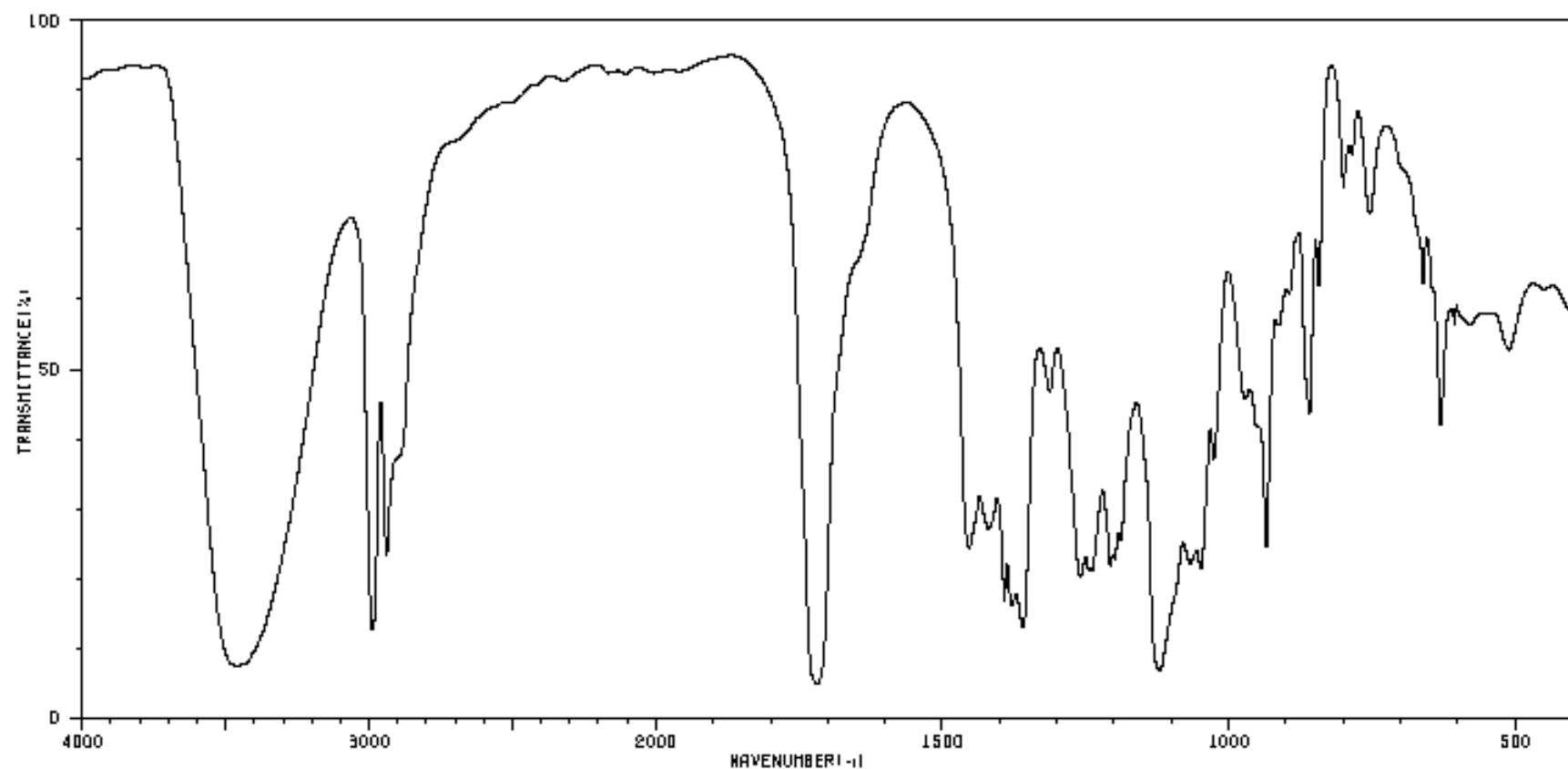
(vi)





4. Describe fundamental vibrations and overtones.
5. A compound with molecular formula C_3H_6O shows a λ_{max} at 292 nm (ϵ max 50) and strong IR stretching band at 1738 cm^{-1} . Identify the compound.
6. An air-conditioning filter was badly contaminated by an oily substance, which have been a mineral oil (engine lubricating oil) or a vegetable oil. IR spectrum of the contaminant showed a strong absorption near 1720 cm^{-1} . Which was the contaminant ?
7. How can you distinguish between 5% and 95 % (v/v) solutions of butanol in CCl_4 using IR spectroscopy ?

IR spectrum of a compound with molecular formula $C_4H_8O_2$ is given below. Identify the compound.



9. An aliphatic aldehyde $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CHO}$ exhibits $-\text{C}=\text{O}$ and $-\text{C}=\text{C}-$ stretching at 1740 cm^{-1} and 1650 cm^{-1} respectively. Will $\text{CH}_3\text{CH}=\text{CH}-\text{CHO}$ exhibit the corresponding vibrations at the same frequencies ? Explain ?