

B.Sc. semester IV ORGANIC CHEMISTRY (Prof Era Garg)

Some Important / Test Questions

- Q.1. (a) What do you understand by Infrared active transitions?
(b) Explain, phenyl acetate absorbs at a higher frequency than methyl benzoate.
(c) Write notes on: (i) rocking and (ii) wagging vibrations.

Q.2. Explain

- a) Effect of hybridization of carbon on the stretching frequency of C-H bonds.
b) sample containers for IR spectroscopy are made of NaCl
c) cis-1,2-Dichloroethylene is IR active while trans-1,2-dichloro-ethylene is IR inactive.
d) The carbonyl stretching vibration of an aldehyde is slightly higher than that of the corresponding methyl ketone.

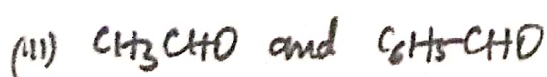
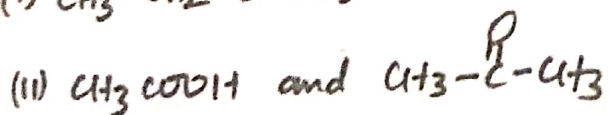
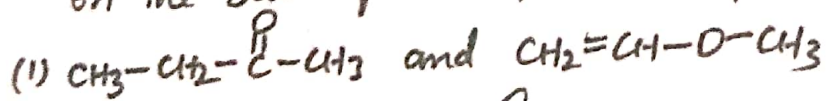
Q.3. Write notes on

- a) vibrational coupling
b) Hooke's law

Q.4. a) How hydrogen bonding affects vibrational frequency in IR spectroscopy?

b) What is fingerprint region in the IR spectrum, how is it useful in structure elucidation?

c) How will you distinguish between the following pairs on the basis of IR spectroscopy?



QUESTIONS

Q.5 a) Oxidation of 2-propanol to propanone is carried out. How will you study the progress of the reaction using IR spectroscopy?

b) A compound with molecular formula $C_3H_6O_2$ shows a strong absorption band at 1718 cm^{-1} and broad absorption bands in the region $3000-2500\text{ cm}^{-1}$. What is the possible structure.

Q.6. a) Discuss briefly the applications of IR spectroscopy

b) Explain

(i) The frequency of $C=O$ stretching vibration of acid chloride is much higher than that of a typical ketone.

(ii) The carbonyl absorption of the carboxylate ion differs considerably from the parent acid.

Q.7. a) A compound with molecular formula $C_8H_8O_2$ shows IR absorption bands at $\sim 3030, 2820, 2730, 1700, 1680$ and 820 cm^{-1} . Identify the compound.

b) Why is methanol a good solvent for UV but not for IR spectroscopy?

Q.8. a) Explain the importance of inductive effect and resonance effect in IR spectroscopy.

b) How will you differentiate between the following pairs of compounds by IR spectroscopy.

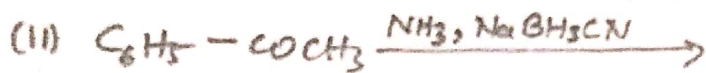
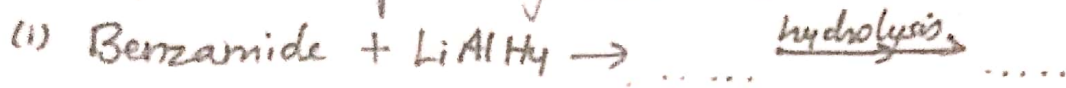
(i) 3-pentanone and cyclopentanone (ii) CH_3COCl , CH_3COOH

Q.9. Explain, the frequency of $C=O$ stretching vibration of acid chlorides is much higher than that of a typical ketone.

Some Important / Test Questions

- Q.10. (a) How would you prepare ethylamine by
- 1) Reductive amination
 - ii) Gabriel phthalimide synthesis

(b) Complete the following reactions



Q.11 a) Why amines are basic in character? Explain.

b) Compare the basic character of primary, secondary and tertiary amines.

Q.12 a) What is Schotten-Baumann reaction. Give its mechanism.

b) How will you prepare sulphamic acid from aniline? Give evidence in favour of its zwitterion structure.

Q.13 a) Explain

i) Aniline is weaker base than ammonia

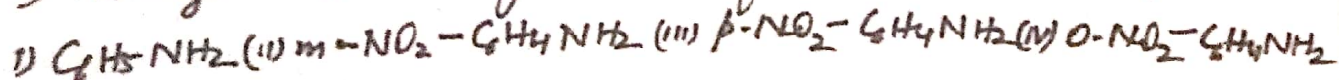
ii) Ethylamine is more basic than aniline

iii) Diethylamine is a stronger base than methylamine

Q.14 a) What is meant by protection of amino group.

b) Why sulphamic acid is soluble in dil NaOH but not in dil HCl?

c) Arrange in increasing order of their basicities:



Q.15. a) Discuss methods of separation of a mixture of 1°, 2° and 3° amines.

b) Explain why order of basicity of substituted aniline is as follows: $p\text{-methoxyaniline} > \text{aniline} > m\text{-methoxyaniline}$