

Organic Chemistry Practice Questions: Infrared Spectroscopy

1. The intensity of an absorption band is always proportional to which of the following factor?

- a) Atomic population
- b) Molecular population of the initial state
- c) Molecular population of the final state
- d) Temperature

2. On which factors the vibrational stretching frequency of diatomic molecule depend?

- a) Force constant
- b) Atomic population
- c) Temperature
- d) Magnetic field

3. In which unit Force constant is not expressed?

- a) Dynes cm^{-1}
- b) dyne \AA^{-1}
- c) Nm^{-1}
- d) kp

4. The vibrations, without a center of symmetry which of the following is correct?

- a) Infrared active
- b) Inactive in IR
- c) Both a and b correct
- d) Both a and b wrong

5. The frequency of vibration of a bond is a function of which factor?

- a) Force constant of the bond
- b) Masses of the atoms involved in bonding
- c) Force constant of the bond and Masses of the atoms
- d) Bond order

6. What is the correct increasing order of stretching frequencies for $\text{C} \equiv \text{C}$, $\text{C} = \text{C}$ and $\text{C} - \text{C}$?

- a) $\text{C} - \text{C} > \text{C} = \text{C} > \text{C} \equiv \text{C}$
- b) $\text{C} \equiv \text{C} > \text{C} = \text{C} > \text{C} - \text{C}$

- c) $C - C > C = C < C \equiv C$
d) $C \equiv C < C - C > C = C$

7. Which of the following is the wave number of near infrared spectrometer?

- a) $4000 - 200 \text{ cm}^{-1}$
b) $200 - 10 \text{ cm}^{-1}$
c) $12500 - 4000 \text{ cm}^{-1}$
d) $50 - 1000 \text{ cm}^{-1}$

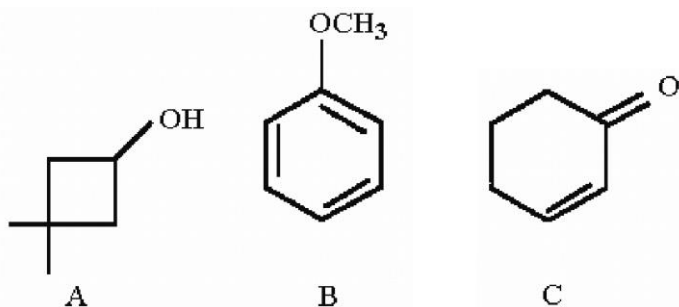
8. Which compound would be expected to show intense IR absorption at 3300 cm^{-1} ?

- A) butane
B) $\text{CH}_3\text{CH}_2\text{C}\equiv\text{CH}$
C) $\text{CH}_3\text{C}\equiv\text{CCH}_3$
D) but-1-ene

9. Which compound would be expected to show intense IR absorption at 2820 , 2710 and 1705 cm^{-1} ?

- A) $\text{CH}_3\text{COCH}_2\text{CH}_3$
B) $\text{CH}_2=\text{CHCOCH}_3$
C) PhCOCH_3
D) PhCHO

10. Which compound would be expected to show intense IR absorption at 1680 cm^{-1} ?



11. Ethyne (HC≡CH) does not show IR absorption in the region 2000-2500 cm⁻¹ because:

- A) C≡C stretches occur at about 1640 cm⁻¹.
- B) there is a change in the dipole moment when the C≡C bond in ethyne stretches.
- C) there is no change in the dipole moment when the C≡C bond in ethyne stretches.
- D) C-H stretches occur at lower energies.

12. Which compound would be expected to show intense IR absorption at 2250 cm⁻¹?

- A) (CH₃)₂CHCN
- B) CH₃CH₂CH₂CO₂H
- C) CH₃CH₂CH₂CONH₂
- D) (CH₃)₂CHCH₂OH

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Note: Answers will be provided in next class.