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## Sardar Patel University

M. Sc. Pharmaceutical Chemistry, Third Semester Examination

Thursday, 27<sup>th</sup> October, 2016

02:00 p.m. – 05:00 p.m.

PS03CPCH03: Spectroscopic Techniques for Quality Control

Note:

Total Marks: 70

1. Figures to the right indicate marks.
2. Draw neat and labeled diagram, wherever necessary.

Q-1 Attempt the followings

[08 X 01 = 08]

1. According to our best observations, light is a
  - a) Wave phenomenon
  - b) Particle phenomenon
  - c) Either a wave or a particle nature
  - d) Neither wave nor particle nature
2. Molar absorptivity is the measure of the
  - a) Amount of light absorbed per unit length
  - b) Amount of light absorbed per unit concentration
  - c) Amount of light reflected and absorbed per unit concentration
  - d) None of the above
3. UV-Vis spectroscopy of organic compounds is usually concerned with which electronic transition(s)?
  - a)  $\sigma \rightarrow \sigma^*$
  - b)  $n \rightarrow \sigma^*$
  - c)  $n \rightarrow \pi^*$  and  $\pi \rightarrow \pi^*$
  - d) None
4. According to the Lambert's Law
  - a)  $I_t = I_0 e^{-kt}$
  - b)  $I_t = I_0 e^{-kc}$
  - c)  $I_t = I_0 e^{-kl}$
  - d)  $I_t = I_0 e^{-k0}$
5. Infrared spectroscopy provides valuable information about
  - a) Molecular weight
  - b) Melting point
  - c) Conjugation Resonate
  - d) Functional groups
6. When induced magnetic field reinforces the applied magnetic field it \_\_\_\_\_.
  - a) Deshields
  - b) Shields
  - c) Vibrates
  - d) Resonates
7. Coupling causes the peaks in <sup>1</sup>H NMR spectra to be split into
  - a) One peak
  - b) Two peaks
  - c) Multiple peaks plus one
  - d) Multiple peaks minus one
8. Which of the following statements regarding mass spectrometry is false?
  - a) The base peak is usually the most intense peak
  - b) The molecular ion peak is usually seen after base peak
  - c) The molecular ion sometimes is very weak
  - d) The base peak is usually seen after molecular ion peak

Q-2 Answer the following questions (Any seven).

[07 X 02 = 14]

1. What is the principle of fluorimetry.
2. Write the various application of flame emission spectroscopy.
3. What do you mean by atomization technique?
4. Write a short note on chromophoric effect.
5. Explain about the types of ion formed in Mass spectroscopy
6. What are the advantages of TMS used in NMR spectroscopy?
7. Discuss the source of radiation used in IR.
8. Explain the different ionization methods used in Mass spectrometry.
9. What is coupling constant?

- Q-3 (A) Write a principle, theory and applications of flame emission spectroscopy. [06]  
(B) Write a detail note on instrumental methods and its classification. [06]

**OR**

- (B) Give a detail account on types of analytical techniques. [06]

- Q-4 (A) Write a detail note on Lambert Beer's law. [06]  
(B) Discuss in detail on requirement of UV-Visible absorption spectroscopy. [06]

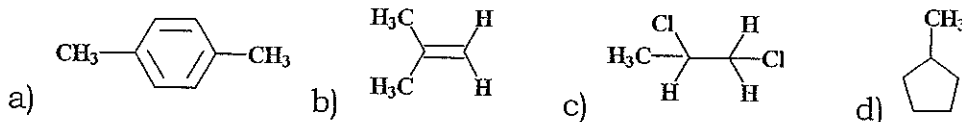
**OR**

- (B) What do you mean by FTIR? Discuss various applications and limitations of IR spectroscopy. [06]

- Q5 (A) Mention the principles involved in NMR spectroscopy and explain with neat diagrams the basic requirements in NMR spectroscopy. [06]  
(B) Calculate the chemical shift in ppm for a proton that has resonance at 126 Hz downfield from TMS on spectrometer that operates at 60 MHz. [06]

**OR**

- (B) Giving reasons find out the number of signals generated in NMR spectrum for the following molecules [06]



- Q6 (A) Write a short note on chemical shift in NMR spectroscopy. [06]  
(B) Explain the construction and working of quadrupole used in mass spectroscopy. [06]

**OR**

- (B) Draw a block diagram of a typical mass spectrometer and discuss different types of ionization techniques employed in mass spectrometry. [06]

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