

SARDAR PATEL UNIVERSITY
M.Sc. Organic Chemistry
Semester - III, External Examination
April 09, 2018 Monday
Time: 02:00 pm - 05:00 pm
Spectroscopy-I [PS03CORC01]

[Total Marks - 70]

N.B. Figures to the right indicate full marks

Q.1 Select the correct answer from the following.

08

1. During volatilization step, small solid molecular particles convert into
 - (a) Into molecular vapor form
 - (b) Neutral free gaseous species
 - (c) Fine aerosol droplets of molecular form
 - (d) free gaseous atom ions.
2. Which condition is suitable for stock fluorescence?
 - (a) $\lambda_F > \lambda_A$
 - (b) $\lambda_A > \lambda_F$
 - (c) $E_F > E_A$
 - (d) $E_F = E_A$
3. Interaction of micro waves with matter result into change in direction of resultant electron spin called _____.
 - (a) ESR
 - (b) NMR
 - (c) X-ray
 - (d) IR
4. In AAS, _____ is a continuous source which emits radiation over a wide range of wavelength.
 - (a) Hollow cathode lamp
 - (b) Xe-lamp
 - (c) Hg vapor lamp
 - (d) Laser
5. _____ is a reagent whose reaction with an interferant is more favorable than the interferant's reaction with analyte.
 - (a) Protecting agent
 - (b) both of these
 - (c) Releasing agent
 - (d) none of all
6. Fluorescence more commonly found in compounds in which lowest energy transition is _____.
 - (a) $\sigma - \sigma^*$
 - (b) $n - \Pi^*$
 - (c) $n - \sigma^*$
 - (d) $\Pi - \Pi^*$
7. The probability of emission of auger electron decrease with _____ atomic number of the emitting element.
 - (a) Increasing
 - (b) Decreasing
 - (c) Both a & b
 - (d) None of all
8. _____ is energetic level at which the attraction of particular atom becomes identical to its attraction to other atom in solid.
 - (a) Conduction band
 - (b) Fermi level
 - (c) Valence band
 - (d) none of all

Q.2 Write the answer of the following in short.(Any Seven)

14

1. What do you mean by pre-burn time? Give its importance.
2. AAS is more preferable then AES is the easiest method for quantitative analysis of

CP, T. O.)

metal in presence of interference.

3. Aniline gives fluorescence but nitro benzene does not give fluorescence. Why? 03
 4. Explain how structural rigidity affects the fluorescence? 03
 5. Give detail of Spherical electrostatic analyzer used in ESCA. 06
 6. Discuss the binding energy and work function. 06
 7. Explain the basic principle of AFM. 06
 8. Explain the detail about tip and cantilever used in AFM. 06
 9. Give neat and labeled diagram of STM instrument. 06
- Q.3** (A) 1. Describe the mechanism for LMM Auger electron formation. 03
2. Explain theory of ESCA. 03
- (B) Explain the two analytical application of ESCA. 06
- OR**
- (B) Discuss in detail any two analytical applications of auger electron spectroscopy. 06
- Q.4** (A) Draw neat and labeled diagram of typical design of atomic force microscope and explain the applications of AFM. 06
(B) Give the detail about the instrumentation and working of Scanning electron microscopy. 06
- OR**
- (B) Write a short note on Scanning tunneling microscopy. 06
- Q.5** (A) Write a note on Photomultiplier tube. 06
- (B) 1. Write a sequence of events taking place in aromatization of sample in FES. 03
2. Compare the AAS and AES. 03
- OR**
- (B) Write a note on Inductively coupled Plasma Emission Spectroscopy (ICPES) 06
- Q.6** (A) Write a note on mechanism of fluorescence 06
(I) E-type delayed Fluorescence
(II) P-type delayed Fluorescence
- (B) Explain Fluorescence, Phosphorescence and Chemiluminescence. 06
- OR**
- (B) 1. Explain the theory of Photoluminescence. 06
2. Write a note on Collisional deactivation and Collisional activation process. 06

-----***-----