

SEAT No. \_\_\_\_\_

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## Sardar Patel University

B. Sc. (Semester – V) Examination

Date: 24-12-2020, Thursday

Time: 02:00pm - 04:00pm

Industrial Chemistry

COURSE NO: US05CICH21 (Advance Organic Chemistry)

Notes: Figures to the right indicate full marks.

Total marks: 70

Q.1 Answer the following Multiple-Choice Questions. (All are compulsory) (10)

- Enantiomers are:
  - Molecules that have a mirror image.
  - Molecules that have at least one stereogenic center.
  - Non-superposable molecules.
  - Non-superposable molecules that are mirror images of each other.
- Which of these is a comparatively insignificant factor affecting the magnitude of specific optical rotation?
  - Concentration of the substance of interest
  - Purity of the sample
  - Temperature of the measurement
  - Length of the sample tube
- Which of the following carbocation has the least stability?
 

A. Methyl	C. Tert-butyl
B. Ethyl	D. Isopropyl
- Aluminum isopropoxide is an important ..... reagent
 

A. Reducing	C. Brominating
B. Oxidizing	D. Methylating
- .....reagent is prepared by refluxing anhydrous isopropyl alcohol with aluminum amalgam in the presence of a small amount of  $\text{CCl}_4$  as a catalyst.
 

A. $(\text{Me}_2\text{CHO})_3\text{Al}$	C. $\text{LiAlH}_4$
B. NBS	D. $\text{OsO}_4$
- Transmittance can be mathematically given by equation .....
 

A. $-\log A$	C. $I \times I_0$
B. $I/I_0$	D. $A/I$
- The decrease in wavelength due to substitution on a chromophore is known as \_\_\_\_\_ shift in UV-VIS spectroscopy.
 

A. Red shift	C. Blue shift
B. Hyperchromic shift	D. None Of Them
- .....spectroscopy is also termed as vibrational spectroscopy.
 

A. UV spectroscopy	C. MASS spectroscopy
B. IR spectroscopy	D. NMR spectroscopy
- Coupling causes the peaks in  $^1\text{H}$  NMR spectra to be split into.....
  - Two peaks
  - multiple peaks equal to the number of hydrogens on surrounding atoms
  - multiple peaks equal to the number of surrounding carbon atoms
  - multiple peaks equal to the number of hydrogen on surrounding atoms, plus one
- When placed in a magnetic field, all the random spins of the nuclei.....
  - Stop
  - Reverse direction
  - Align with the magnetic field
  - Rotate to  $90^\circ$  away from the induced field

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Q.2 Are the following statements true or false? (All are compulsory) (08)

1. Any molecule with a stereocenter must have a stereoisomer – True/False?
2. Some chiral compounds are optically inactive – True/False?
3. Heterolytic cleavage of a carbon-carbon bond produces “Two carbonium ions” - True/False?
4. “Methyl” carbocation has the least stability than “Tert-butyl” - True/False?
5. Tertiary amines generally give two distinct peaks in IR spectrum - True/False?
6. Generally, C-H stretching of aldehyde gives strong bands - True/False?
7. Chemical shifts are larger when shielding effects are greater - True/False?
8. NMR signals towards the left of the spectral chart correspond to larger chemical shifts - True/False?

Q.3 Answer the following short questions (Attempt Any 10 out of 12) (20)

1. Define term “Diastereomers”
2. What is a necessary but not a sufficient condition for optical activity?
3. State the necessary conditions for a compound to show optical isomerism.
4. Write a preparation and properties of “Aluminum isopropoxide”.
5. Write a preparation and properties of “Diazomethane”.
6. Write a preparation and properties of “N-Bromosuccinimide”.
7. Write about information obtained from IR Spectroscopy.
8. Name the detectors used in IR spectroscopy.
9. Name various detectors used in UV spectrophotometer.
10. Enlist the information obtained from <sup>1</sup>H NMR Spectroscopy.
11. The NMR spectrum of compound C<sub>2</sub>H<sub>6</sub>O shows one signal only, a singlet. Deduce the structure of it.
12. What are the characteristics of TMS?

Q.4 Answer the following Long questions (Attempt Any 04) (32)

1. Write note on Polarimeter.
2. Write note on “Racemic modification”.
3. Describe the mechanism and important applications of “Benzilic acid rearrangement”.
4. Describe the mechanism and important applications of “Pinacol–Pinacolone Rearrangement”.
5. Write the principle of IR spectroscopy and discuss the applications of IR-Spectroscopy.
6. With diagrammatic representation, explain single beam and double beam spectrophotometer.
7. What is Chemical Shift? How to measure it? What are the factors affecting chemical shift?
8. Write a note on main parts of NMR spectrometer.