

SCHOOL OF CHEMICAL AND LIFE SCIENCES
B.SC. M.SC. INTEGRATED PROGRAM IN CHEMISTRY
SEMESTER-V EXAMINATION-2020
PAPER TITLE: SPECTROSCOPY AND POLYMERS
PAPER CODE: BCH-CC14TH

Maximum Marks: 75

Duration of time: 3--Hrs

Note: please write the roll number at the top the answer sheets. It should be noted that 20 min extra time will be provided for uploading the answer sheet in pdf format.

Q1A. Multiple choice/short answer type/fill in the blanks

0.5x10=05 marks

A. The sample holder for UV spectroscopy must be made of

- (a) glass
- (b) plastic
- (c) metal
- (d) quartz

B. Quadrupole nuclei have spin greater than

- (a) half
- (b) 1
- (c) 2
- (d) None of these

C. Which of the following statements is not a reason why tetramethylsilane is used as a ^1H chemical shift reference?

- (a) Its ^1H spectrum is a singlet.
- (b) Its protons are quite strongly shielded.
- (c) It dissolves in most organic solvents.
- (d) It is unreactive.
- (e) Most organic compounds do not contain silicon atoms

D. Which of the following is true for absorption of IR radiation?

- (a) Homonuclear diatomic molecules absorb IR
- (b) Heteronuclear diatomic molecule absorb IR
- (c) Both A and B are true
- (d) Diatomic molecules will not absorb IR

E. The product of hydrolysis of "lactose" is

- (a) Soluble starch
- (b) Glucose
- (c) Fructose
- (d) Maltose

F. Which of the following glycosidic linkage found in maltose?

- a) Glucose (α -1 – 2 β) Fructose
- b) Glucose (α 1 – 4) Glucose
- c) Galactose (β 1 – 4) Glucose

- d) Glucose (β 1 – 4) Glucose
- G. Which of the following is a thermosetting polymer?
- Polystyrene
 - Polyolefins
 - Nylons
 - phenolic resins
- H. Which of the following kind of polymers are known for their high crystallinity?
- Isotactic
 - syndiotactic
 - atactic
 - none of the mentioned
- I. In the equation, $A = \epsilon bc$, what quantity is represented by " ϵ "?
- Absorbitivity
 - Molar absorbitivity
 - Path length
 - Transmittance
- J. Which of the following monomers are unsuitable for condensation polymerization?
- propanoic acid and ethanol
 - butane-dioic acid and glycol
 - diamines and dicarboxylic acids
 - hydroxy acids

Q1B. Answer in two - three lines (short answer type)

1x10=10 marks

- Acetone absorbs light at 280, 187 and 154 nm. Which are the transitions responsible for each of these absorptions?
- Which are the possible number of vibrational bands for CO_2 ?
- What is transmittance?
- What is a biodegradable polymer? Give an example of a biodegradable aliphatic polyester.
- Which are the materials that are used for preparation of pellets for solid samples of analyte in IR
- Differentiate between aldo and keto sugars?
- Which are the epimers of glucose?
- What are reducing and non-reducing sugars, give examples.
- Write the names and structures of the monomers of Nylon-6,6, Bakelite and Polystyrene
- What does the designation '6, 6' mean in the name nylon-6, 6?

Q2. Answer any one of the following:

15 marks

- A. Where will the following compounds exhibit peaks in a PMR spectrum: Acetone, Dimethyl ether, Methyl acetate Methyl iodide, ibromomethane, chlorobromomethane, 1,2- dibromoethane, 1-chloro-2-bromoethane.

(OR)

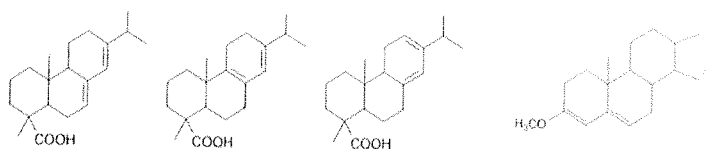
- B. Deduce the identity of the following compounds from the ^1H NMR data given

$\text{C}_5\text{H}_{11}\text{Cl}$: δ 3.19 (2H, singlet), 0.89 (9H, singlet)

Q3. Answer any one of the following:

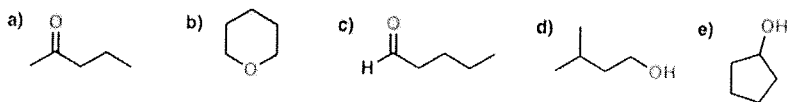
15 marks

- A. Use Woodward-Fieser Rules to predict λ_{max} of the following



(OR)

- B. How can you differentiate between the following on the basis of their IR spectra



Q4. Answer any one of the following:

15 marks

- A. How is determination of ring size of glucose and fructose carried out by classical methods?

(OR)

- B. Discuss the method used for chain lengthening and chain shortening of aldoses?

Q5. Answer any one of the following:

15 marks

- A. Discuss different methods of fibre production

(OR)

- B. Give the structure and applications of Polyurethanes and phenolic resins
