Seat No. _____ Enrolment No. _____

CVM UNIVERSITY

M.Sc. (Industrial Chemistry), Semester- 3
November - 2021
Subject: 101310303—Spectroscopy & Instrumental Techniques
Tuesday, 16th November – 2021

Time: 01:30 P.M. to 03:30 P.M. **Total Marks: 60**

Note: i) Attempt all the questions.
ii) Figures to right indicate full marks.
iii) Draw neat diagrams wherever it requires.

Q-1 **Answer the following Multiple Choice Questions.** **Marks (12)**

1. _____ion identify as quasi molecule in mass spectrometry.
   a) M* c) $M^{\cdot+}$
   b) $(M+H)^+$ d) All of these
2. Soft ionization technique is used in _____technique.
   a) MS-MS c) Quadrapole
   b) Time of flight d) single focusing
3. _____band arises when a molecule in a lowest vibration energy level directly goes to second vibration energy level.
   a) Combination c) Fermi
   b) Overtone d) All of these
4. If spin quantum number I=0, then the sample is NMR _____.
   a) Inactive c) active
   b) partially active d) none of these
5. _____ relaxation process, transferring ΔE to a neighboring nucleus.
   a) spin-lattice c) spin-spin
   b) lattice-lattice d) none of these
6. Difference in frequency in ppm (Hz) from TMS is_____.
   a) chemical shift c) Shielding
   b) De-shielding d) anisotropic
7. NMR spectroscopy is used to find the presence of_____.
   a) ^3H c) ^{14}N
   b) ^{12}C d) None of these
8. The column is _____ in normal phase chromatography.
   a) polar c) bi-polar
   b) non-polar d) all of these
9. Eddy diffusion arises from the magnitude of_____.
   a) path way c) pressure
   b) flow d) temperature

10. Gradient elution refers to_____.

a) changing the solvent composition over time
b) changing the column temperature over time
c) column "bleed" as the temperature is ramped
d) reversed instead of normal phase LC

11. _____is typically by far the strongest X-ray spectral line for an element bombarded with energy sufficient to cause maximally intense X-ray emission.

a) L-alpha c) K-alpha
b) M-alpha d) N-alpha

12. The rate of change of mass, dm/dt depends on the amount of sample present, and the _____ constant at the experimental temperature.

a) reaction rate c) pressure
b) temperature d) weight

Q-2 Answer the following short questions. (**Any Eight**) **(16)**

1. What is the possible vibration frequency of alkenes and primary amine?
2. Give the equation of resolution in the mass spectrogram.
3. Give cleavage of 1-pentene.
4. What is Hooke's law?
5. Define shielding-De-shielding.
6. What are the solvents used in NMR?
7. Define: Theoretical Plate, Partition ratio.
8. What is a guard column?
9. How to calibrate TGA instrument?
10. What is Moseley's law?

Q-3 Draw a schematic diagram of dispersive double beam IR spectrometer and explain various parts of the instrument **(08)**

OR

Q-3 Explain with example the basic principle of Mass Spectrometer and explain with diagram components of the double-focusing mass spectrometer. **(08)**

Q-4 What is the condition for NMR spectroscopy? Explain with the figure the absorption phenomenon and relaxation process in NMR. **(08)**

OR

Q-4 Explain with figure instrumentation of NMR. **(08)**

Q-5 Give the classification of chromatography. Explain the theory of elution chromatography. **(08)**

OR

Q-5 Draw a schematic diagram of HPLC and explain in brief different parts of it. What is normal phase and reverse phase chromatography? **(08)**

Q-6 Draw a schematic diagram of the TGA instrument and explain various parts of it. Show the thermal decomposition of barium perchlorate trihydrate. **(08)**

OR

Q-6 Write the principle of XRD. Briefly explain the various application of XRD. **(08)**

All the Best!

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Seat No. _____ Enrolment No. _____

CVM UNIVERSITY
EXTERNAL EXAMINATION
M.SC. INDUSTRIAL CHEMISTRY
(THIRD SEMESTER)
101310304: Process Safety Management and Transportation of Fluids
Wednesday, 17th November - 2021

Time: 1:30 pm to 3:30 pm **Total Marks: 60**

Instructions:
- Attempt all questions.
- Numbers to the right indicate full marks for each question.

Q. 1 **Answer the following multiple choice questions.** **[12]**

1. Managing exposure is part of _____.
   a. Engineering control b. Hierarchy of control
   c. Selection of PPE's d. Investigation control
2. Frostbite is the result of extreme exposure of_____.
   a. Cold stress b. Work stress
   c. Psychological stress d. Heat stress
3. Mineral oil is _____liquid.
   a. Combustible b. Metallic c. Flammable d. High volatile
4. The sacrificial instrument used in protection against failure due to pressure increase is_____.
   a. Attenuator b. Blow off cock
   c. Rupture disc d. Relief valve
5. Explosive dusts to be stored as slurry is an example of_____ method.
   a. Adequate training b. Limitation c. Attenuation d. Simplification
6. Lowest temperature at which material will ignite from an open flame is called _____.
   a. Flash point b. Adiabatic temperature
   c. Fire point d. Auto ignition temperature
7. The machine which raises the liquid from lower level to higher level using centrifugal force is known as_____.
   a. Wire b. Volute casing
   c. Centrifugal pump d. Ostwald viscometer
8. Which of the following is used to measure liquid discharge form reservoir?
   a. Notch b. Venturimeter c. Orifice meter d. None of these
9. An ideal fluid is_____.
   a. Highly viscous b. Frictionless & incompressible
   c. Obey Newton's law viscosity d. Always in turbulent range
10. Difference between theoretical and actual discharge of pump is called_____.
    a. Volute b. Lift c. Slip d. NPSH
11. Which of the following pump required Priming?
    a. Piston b. Plunger c. Centrifugal d. None of these
12. Equation P/ρ gives_____.
    a. Pressure head b. Velocity head
    c. Momentum d. Gravity head

Q.2 Attempt **any eight** of the following. **[16]**

1. Define the term attenuation with example.
2. Differentiate between performance and condition monitoring.
3. What are the five employer regulatory requirements includes in HazCom programme to keep employee safe?
4. What are the major problems associated with reactor design?
5. What is chemical inventory?
6. Write the Bernoulli's theorem. Brief its significance.
7. What is fluidization? Enlist two types of it.
8. What is disengaging height in fluidization column?
9. What does mean by Reynolds number of particle?
10. What is terminal settling velocity? Write its unit.

Q. 3 Explain the importance of 5S in good housekeeping **[08]**

OR

Q. 3 Discuss the following methods to control the hazardous materials? **[08]**
a. Substitution b. Containment c. Disposal d. Ventilation

Q. 4 Discuss the classification, selection and types of Respirators. **[08]**

OR

Q. 4 Discuss the guidelines for safe handling and storage of Flammable and Combustible Materials. **[08]**

Q. 5 A single acting reciprocating pump used for pumping water has a piston of 0.12m diameter and a stroke length is 0.30m.the pump centre is 4m above suction and 30m below delivery level. The diameter of suction pipe is 0.068m and that of delivery pipe is 0.05m. if pump works at 60 revolution per minute and has mechanical efficiency of 75%. ($\rho = 1000kg/m^3$, $\mu = 0.001kg/m.sec$). Determine the following: **[08]**
1. Theoretical power 2. Actual power required to drive the pump

OR

Q. 5 A water is to be pumped in a 30×10^{-2} m diameter pipe which is 0.15×10^7 cm long at $0.010m^3/sec$. Density and viscosity of water is $1000kg/m^3$ & 0.001 kg/m.sec respectively. Determine the following: **[08]**
1. Power required to run the pump 2. Loss at entrance 3. Loss at exit

Q. 6 Sample particles with diameter 0.03mm are rotated in water suspension by centrifuge of internal diameter 1.2m and outer diameter 2.4m. Determine the settling time is required to separate the particles (density $7500kg/m^3$) from water of density $1000kg/m^3$ and viscosity is 0.001kg/m.sec; if the centrifuge rotates at 600 radian/minute. **[08]**

OR

Q. 6 A cylindrical column is packed with solid particles of diameter 145×10^{-5} m and density 2690 kg/m^3 up to a height of 15mm. These particles are to be fluidized using air of density 8.9kg/m3 and viscosity 0.0032 kg/m.sec if a porosity of 0.55 is expected at minimum fluidization. Determine the following: **[08]**
a. Height of solid bed & Pressure drop at minimum fluidization
b. Operating range of fluid velocity

...Good Luck...

CVM UNIVERSITY

Total No. of Printed pages:02

M.Sc. (Industrial Chemistry)
Semester-III Examination-NOV '2021
Thursday, 18/11/2021
101310305: Pharmaceutical Technology

01:30 PM to 03:30 PM **Total Marks: 60**

Note: (1) Attempt all questions.
(2) Figures to the right indicate Full marks.

Q. 1 Answer the following multiple choice questions. **(12)**

(1) _____ is the most promising form of therapy
A. Physiotherapy B. Chemotherapy C. Radiotherapy D. Surgery

(2) The most common targets for drugs – receptors are located at _____ in the body.
A. Cellular level B. Muscular level C. Tissue level D. None of these

(3) _____ trials are conducted on animals
A. Phase I B. Phase II C. Phase III D. Preclinical

(4) In _____ tablets the drug is released slowly over extended time period
A. Delayed release B. Sustained release
C. Dispersible tablet D. Chewable tablet

(5) The lower weight limit for formulation of a tablet is usually _____
A. 5 mg B. 25 mg C. 50 mg D.75 mg

(6) There are _____ standard capsule sizes, and the largest capsule size considered suitable for oral use is size _____
A. 00, 8 B. 8, 000 C. 8, 00 D. 8, 0

(7) Novel drug delivery system improves_____
A. Potency B. Efficient use of drug
C. Therapeutic effect D. All of these

(8) Microspheres are the free flowing powder having particle size less than ____ microns
A. 100 B.200 C. 300 D. 400

(9) _____ are the matrix system in which the drug is uniformly dispersed
A. Nanospheres B. Nanocapsules
C. Hard gelatin capsules D. All of these

(10) _____ is the heart and soul of quality control
A. QC B. GMP C. GLP D. QA

(11) _____ section of ICH guidelines includes GMP for API
A. Q1 B. Q.3 C.Q.5 D. Q.7

(12) _____ are the written procedures for the laboratory programmes
A. GLP B. GMP C. SOP D. QA

Q.2 Attempt **any eight** of the following short questions. **(16)**

(1) Define and differentiate the terms drugs and pharmaceuticals
(2) What is polymorphism?
(3) What is bioavailability of drug?
(4) Define the term tablet and enlist its advantages
(5) Differentiate between creams and ointments
(6) Differentiate between Type A and Type B Gelatin
(7) What is ICH guideline?
(8) Define the term GLP
(9) What is control drug delivery system?
(10) Differentiate between single punch and rotary tableting machines

Q. 3	What is pharmacokinetics and Pharmacodynamics? Discuss in brief the ADME process and various drug actions on the body.	**(08)**
	OR	
Q.3	What is Preformulation? Explain in detail about various studies carried out under preformulation.	**(08)**
Q. 4	Explain the different types of tablets in brief and write a detailed note on Effervescent tablets and Lozenges	**(08)**
	OR	
Q. 4	Explain the term excipient. Write a detailed note on various excipients used in pharma industries with special emphasis on their functions and examples.	**(08)**
Q. 5	What is microencapsulation? Discuss in detail about the various methods for encapsulation.	**(08)**
	OR	
Q. 5	What are Nano particles? Write a detailed note on Nano particles with special emphasis on their production and applications	**(08)**
Q. 6	What is QA? Discuss the salient features of QA	**(08)**
	OR	
Q. 6	What is GMP? Discuss in brief about the components included in GMP guidelines.	**(08)**

Best of Luck

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Seat No. _____ Enrollment No. _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY

M.Sc. Industrial Chemistry – SEMESTER 3

WINTER 2021 EXAMINATION

Course Title: Industrial Polymers

Course Code: 101310308

Total Printed Pages : 02

Date: 19/11/2021 **Time: 01.30 pm to 03.30 pm** **Maximum Marks: 60**

Instructions:

- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Q. 1 Answer the following multiple choice questions. **(12)**

(1) The hardness and stiffness of the PVC polymer is due to the presence of chlorine atom caused by the inter-chain attraction:

a. Decreases **b.** Increases
c. Does not change **d.** Can't say

(2) The presence of chlorine in large quantities in the polymer renders its property of.

a. Flammability **b.** Volatility
c. Flames retardance **d.** Increased volatility

(3) Poly (vinyl acetate) has little value in the form of mouldings and extrusions because of its:

a. High cold flow **b.** Low cold flow
c. Harshness **d.** Flammability

(4) A typical route for Adipic acid synthesis is via:

a. Cyclohexane and cyclohexanol **b.** Hexane and hexanol
c. Cyclobutane and n-Octane **d.** Reduction of benzene

(5) A Replacement of the hydrogen will cause a reduction in the interchain attraction and a consequent decrease in softening point of polymer amide can be decreased by replacing H-atom in the -CONH- group by: such groups, and

a. $-CH_3$ **b.** $-CH_2OCH_3$
c. $-C_2H_5$ **d.** All the above

(6) Nylon 6 is prepared by using monomer:

a. Hexamethylene diamine and adipic acid **b.** Hexamethylene diamine and Sebacic acid
c. 1, 4-Diamino butane **d.** Caprolactum

(7) Length-diameter ratio in most commonly used for single-screw extruders common for thermoplastic is ranging from:

a. 10:4 **b.** 30:13
c. 20:1 **d.** 24:4

(8) Mixer screws have mixing sections which are designed as mechanical means to:

a. Break up the polymer **b.** Mix the polymer
c. Rearrange the laminar flow of the melt **d.** All the above

(9) In Single flight, two stage extrusions with mixing section the degassing zone is located:

a. At the place where hopper is installed **b.** At the place where die is installed

c. At the mid where the extruder are separated **d.** Can't say

(10) The temperature region where the polymer transitions from a hard, glassy material to a soft, rubbery material is termed as:

a. Melting temperature (Tm) **b.** Glass Transition temperature (Tg)

c. Curing temperature (Tc) **d.** Vulcanization

(11) The HNBR rubbers contain randomly placed:

a. Amine group **b.** H-atom around double bond

c. Carboxyl groups **d.** Aldehyde group at double bond

(12) The reduced activity of polychloroprene is due to:

a. Phenolic group **b.** Methyl group

c. Acidic group **d.** Chlorine atom

Q.2 Attempt **any eight** of the following. **(16)**

(1) Give the reason in the polymerization reactions the heat of polymerization must be carefully controlled.

(2) Give the diff. between UPVC and PPVC

(3) Describe Tacticity (With Diagram)

(4) Give the difference between Elastomers & plastomers.

(5) Give the reason why aliphatic polyamides are not considered as good insulator.

(6) Give the method to prevent the premature destabilization in elastomer.

(7) Define the phenomenon of Tack.

(8) Give the function of mould.

(9) What is extrusion?

(10) What is blow moulding?

Q. 3 Give the manufacturing process of polyethylene by Ziegler processes and give the application of polyethylene. **(08)**

OR

Q.3 Write a note on the manufacturing process of Polyvinyl chloride and its uses. **(08)**

Q. 4 Describe the Polymer preparation of polycarbonates by Ester exchange process with its advantages and disadvantages. **(08)**

OR

Q. 4 Write a note on manufacturing of Terephthalic acid. **(08)**

Q. 5 Describe the polymerization of styrene by mass polymerization with schematic diagram. Give the application of styrene. **(08)**

OR

Q. 5 Elaborate the manufacturing process of Polyurethane elastomers by one shot process. **(08)**

Q. 6 Reciprocating screw injection moulding and also give the advantages and disadvantages of injection moulding. **(08)**

OR

Q. 6 Write a note on Compression moulding. **(08)**

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