SEAT No._____ No. of Printed Pages : 02

C 597

SARDAR PATEL UNIVERSITY

M. Sc. (Industrial Chemistry), Third (3rd) Semester Examination

November - 2017

SC

PS03CICH02—Spectrosocpy and Instrumental Techniques

Thursday, 2nd November, 2017

Time: 02:00 p.m. to 05:00 p.m. **Total Marks: 70**

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 (08)**

1. How many spin states of hydrogen?
   a) 1 c) 2
   b) 1/2 d) None of these

2. _____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

3. Molecular weight can be determined using _____technique.
   a) IR c) mass spectrometer
   b) NMR d) All of these

4. Soft ionization technique is used in _____technique.
   a) MS-MS c) Quadrapole
   b) Time of flight d) Single focusing

5. In ideal case, the partition ratio is _____over a wide range of solute concentration in chromatographic system.
   a) constant c) decreasing
   b) variable d) increasing

6. Eddy diffusion arises from the magnitude of_____.
   a) path way c) pressure
   b) flow d) temperature

7. _____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

8. A SEM may be equipped with an _____system to enable it to perform compositional analysis on specimens.
   a) EDX analysis c) camera
   b) TEM d) optical microscopy

Q-2 Answer the following short questions. Each question carries equal mark.**(Any Seven)** **(14)**

1. Enlist various modes of vibration in IR.
2. What is Beer's law for absorption?
3. What are the properties of solvent used in NMR?
4. Give the equation of resolution in mass spectrogram.
5. Give cleavage of 1-pentene.
6. What is guard column?
7. Write Van Deemter equation for chromatography.
8. What is Moseley's law?
9. What is the fundamental principle of SEM?

Q-3 (a) Give possible band and vibration frequency of alkynes and aromatic hydrocarbon in IR spectroscopy. **(06)**

Q-3 (b) Explain the effect of temperature on chemical shift value of a) N, N – dimethyl formamide and b) 1, 2- dibromo ethane. **(06)**

OR

Q-3 (b) 1) Interpret the spectral data and deduce the structure of following compound: **(03)**

Molecular formula: $C_6H_{10}O_3$

IR Data (in cm^{-1}): 2985,2950,1460,1380,1830,1750,1050.

NMR Data:

δ	Multiplicity	No. of Protons
2.41	Quartet	4H
1.16	Triplet	6H

2) Derive the mathematical relationship between ΔE and B_0 in NMR. **(03)**

Q-4 (a) Draw schematic diagram of double focusing mass spectrometer and explain various parts of it. **(06)**

Q-4 (b) Explain with figure time of flight (TOF) mass spectrometer. **(06)**

OR

Q-4 (b) Discuss principal of mass spectrometer with suitable example. **(06)**

Q-5 (a) Explain the theory of elution chromatography. **(06)**

Q-5 (b) Explain the sources of zone broadening in liquid chromatography. **(06)**

OR

Q-5 (b) Write a short note on a) peak asymmetry and b) column resolution in HPLC. **(06)**

Q-6 (a) Draw a schematic diagram of DSC and explain various parts of it. **(06)**

Q-6 (b) Draw a schematic diagram of dispersive x-ray spectrometer and briefly explain the various parts of it. **(06)**

OR

Q-6 (b) 1) Write a note on detection of backscattered electrons in SEM. **(03)**

2) How to detect secondary electrons in SEM? **(03)**

All the Best!

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SEAT No._____ No. of Printed Pages : 02

[517]

SARDAR PATEL UNIVERSITY

M. Sc. (Industrial Chemistry), Third (3rd) Semester Examination

November - 2017

PS03CICH08—Process Safety Management and Transportation of Fluids

Monday, 6th November, 2017

Time: 02:00 p.m. to 05:00 p.m. **Total Marks: 70**

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 (08)**

1. The sacrificial instrument used in protection against failure due to pressure increase is_____.
   i. Pr relief valve ii. Rupture disc iii. attenuator iv. blow off cock

2. Identify the correct statement.
   i. Operating pressure should be more than the design pressure
   ii. Operating pressure should be less than the design pressure
   iii. Operating pressure should equal to the design pressure
   iv. Operating pressure has no relation with the design pressure

3. Penalty for exothermic reactions in DOW F & EI index vary from_____.

i. 0.3- 1.25 ii.0.1- 7 iii. 4-10 iv.10-20

4. Material factor for DOW Index is adjusted using the process conditions _____ & _____.

i. flash & boiling point ii. flash & fire point iii. melting & boiling point iv. None of these

5. IDHL is expressed in _____.

i. kg ii. ppm iii.litre iv.litre/min

6. Entrainment in fluidization columns become appreciable _____.

   i. Below critical velocity
   ii. Above critical velocity
   iii. Below minimum fluidization velocity
   iv. Above minimum fluidization velocity

7. $N_{Re,p}$ values less than 2 denotes_____.

   i. Stokes range
   ii. Newtons Range
   iii. Intermediate range
   iv. None of the above

8. The discharge (Q)of a centrifugal pump depends on the rpm of the impeller(N) according to the relation___.

   i. $Q \alpha N$
   ii. $Q \alpha N^3$
   iii. $Q \alpha N^2$
   iv. $Q \alpha N^5$

Q.2 Answer the following short questions. Each question carries equal mark. **(Any Seven)** **(14)**

1. Define the term attenuation and provide an example.
2. Define the terms limitation & simplification as applied to control of hazardous materials.
3. Define knock on effect and provide an example.
4. Distinguish between pressure relief valves and rupture disc.
5. Distinguish between air purifying and atmosphere supplying respirators.
6. Why does cavitation occur in pumps? How can it be prevented?
7. Why are air vessels used in reciprocating pumps?
8. Define discharge & % slip of reciprocating pump.
9. Define fanning friction factor.How do you calculate friction factor in laminar & turbulent ranges.

Q.3

a. Explain the concept of 5S. (6)

b. Explain the various guide lines for the safe handling and storage of flammable and combustible materials. (6)

OR

b. Giving examples, explain the terms TLV, LD_{50} and IDHL. (6)

Q.4

a. Explain the various safety precautions to be taken during nitration and polymerization. (6)

b. Explain the term 'Process Hazard Analysis'. (6)

OR

b. Explain the term Management of Change. (6)

Q.5

a. A single acting reciprocating pump used to transport water has a piston of dia 0.12 m and stroke of length 0.3 m. The pump centre is 4 m above the sump level and 30 m below the delivery level.The diameter of suction pipe is 0.068 m and that of delivery pipe is 0.05 m. If the pump works at 60 rpm and has a mechanical efficiency of 80 %, find the horse power required to drive the pump. The density of water is 1000 kg/m^3 and its viscosity is 0.001 kg/m sec. (6)

b. Prove that the velocity profile over a pipe section is parabolic in shape. (6)

OR

b. A centrifugal pump delivers 0.03 m^3/s of water to a height of 18 m through a pipe 90 m long and 0.1 m diameter. If the efficiency of the pump is 75 % and if the friction factor is 0.012, find the horse power required to drive the pump. (6)

Q.6

a. Derive the equation for terminal settling velocity of a spherical particle moving through a fluid under the action of gravitational force. (6)

b. Catalyst particles of density 8000 kg/m^3 and dia 0.0002 m are to be settled from their mixture with water of density 1000 kg/m^3 and viscosity 0.001 kg/m sec.If a settling time of 100 sec is available, what should be the height of the settling chamber? Use g = 9.81 m/sec^2. (6)

OR

b. A 3m diameter cylindrical column is packed with sand particles (dia 0.0001 m, density 2700 kg/m^3) upto 1.7 m and the particles are to be fluidized using air (density 8.9 kg/m^3, viscosity 0.000032 kg/m sec). If a minimum porosity of 0.55 is assumed, find the minimum fluidization velocity required. (6)

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(125) No. of Printed 2

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SARDAR PATEL UNIVERSITY

SEMESTER EXAM, M.Sc. INDUSTRIAL CHEMISTRY

SEMESTER -3, PS03CICH09-PHARMACEUTICAL TECHNOLOGY

08-11-2017, Wednesday, TIME: 02:00 p.m to 5:00 p.m

Total Marks: 70

Note: Attempt all questions. Draw neat and labeled diagram where ever necessary. Figures on the right show marks.

Q.1. Answer the following MCQs. **(08)**

1. _____ levels of drug in the blood stream will prove to be harmful

A. Toxic B. Critical C. Therapeutic D. All of these

2. The drug will get absorbed in _____ after it crosses the wall of Intestine

A. Stomach B. Blood C. Skin D. Tissues

3. _____ dosage form is most widely used for pharmaceutical products

A. Solid B. Semi solid C. Nasal D. Opthalmic

4. _____ is the most common material for coating of tablets

A. Starch B. Gelatin C. Protein D. Sugar

5. _____ component capsule is known as hard gelatin capsule

A. One B. Two C. Three D. Four

6. _____ is a chemical test done in QC of tablets

A. Disintegration B. Friability C. Assay D. Thickness

7. _____ is a measure of water absorption capacity of the material.

A. Friability B. Compressibility C. Stability D. Hygroscopicity

8. _____ is most important part of validation

A. Documentation B. Formulation C. Granulation D. Sanitation

Q.2 Answer the following short questions **(Any 7)** **(14)**

1. What is tableting?
2. What is BCS classification?
3. Differentiate between Ointment and Cream
4. What are the benifits of controlled release dosage forms?
5. Explain nanocapsules and nanospheres?
6. What is gel? Give its types
7. Discuss the hardness of a tablet?
8. What is validation master plan?
9. What is Syrup?

Q.3 (a) What is Tablet? Discuss the different types of tablets in brief. **(06)**

Q.3 (b) What are excipients? Enlist various important excipients along with their specific functions. **(06)**

OR

Q.3 (b) Discuss the various types of bases used for formulating creams and ointments. **(06)**

Q.4 (a) What are controlled release dosage forms? Discuss its advantages and disadvantages **(06)**

Q.4 (b) Discuss various drug release mechanisms of controlled drug delivery system in brief. **(06)**

OR

Q.4 (b) What are microspheres? Discuss in brief various methods of their synthesis in brief. **(06)**

Q.5 (a) Explain in details various steps involved in tableting. **(06)**

Q.5 (b) What is the importance of preformulation studies in pharmaceutical product development? Discuss various characteristics studied under preformulation in brief **(06)**

OR

Q.5 (b) Discuss the dissolution and friability tests for tablets. **(06)**

Q.6 (a) What is GMP? Discuss its need for pharma products. **(06)**

Q.6 (b) What is GLP? Discuss its importance for pharma products **(06)**

OR

Q.6 (b) What is validation? Write a brief note on process validation. **(06)**

S.C

(124)

SEAT No._____

No. of Printed Pages : 2

SARDAR PATEL UNIVERSITY

M. Sc. Semester - III Examination
Friday, 10th November 2017
INDUSTRIAL CHEMISTRY
Subject: Industrial polymer

Date: 10/11/2017 , Friday
Time: 02:00 p.m. to 05:00 p.m.

Course No. : PS03EICH06
Marks: 70

Q. 1 **Multiple choice questions (Attempt all)** **[08]**

I _____is a colourless liquid with a pungent unpleasant odour.
(a) MMA (b) Vinyl acetate
(c) Ethylene (d) Vinyl chloride

II Polyethylene having 0.945-0.960kg/cm^{3}is known as _____.
(a) LLDPE (b) LDPE
(c) MDPE (d) HDPE

III Bisphenol A may be produced by condensation of _____.
(a) Phenol and acetic acid (b) Toluene and acetic acid
(c) Phenol and acetone (d) Xylene and acetone

IV -$CONH_2$ group is known as _____.
(a) Amino (b) Amide
(c) Imide (d) Acetanilide

V Typical temperature range for natural rubber is _____^{0}C.
(a) -10 to 100 (b) -50 to 100
(c) 50 to 60 (d) -40 to 120

VI _____ monomer is used in the manufacture of EPDM.
(a) Ethylene (b) Diene
(c) Propylene (d) All of these

VII _____is a tube- like piece of plastic with a hole in one end in which compressed air can pass through.
(a)Parison (b) Mold
(c) Injection (d) Clamp

VIII Preheating and pressurizing are the step for _____.
(a) Injection molding (b) Blow molding
(c) Compression molding (d) Film casting

Q. 2 **Answer the following short question (Any seven)** **[14]**

I Enlist the uses:polyethylene.
II Write the uses of MMA.
III Enlist the application of poly vinylalcohol.
IV Write the disadvantages of ester exchange process of polycarbonate.
V Enlist uses of polyethylene terephthalate.
VI Write the uses of polystyrene.
VII Draw the structure of 1,3-butadiene and isoprene.
VIII What is vacuum forming?
IX Write in brief about film casting.

(P.T.O.)

(1)

Q.3	(a)	Write synthesis of vinyl chloride.	[06]
	(b)	With the help of flow diagram explain Ziegler process	[06]
		Or	
	(b)	With the help of flow diagram explain manufacture of vinyl acetate monomer.	[06]
Q.4	(a)	With the help of flow diagram explain manufacture of nylon 6.	[06]
	(b)	With the help of flow diagram explain manufacture of terephthalic acid	[06]
		Or	
	(b)	Write explanatory note on phosgenation process.	[06]
Q.5	(a)	With the help of flow diagram explain manufacture of SBR by emulsion polymerization.	[06]
	(b)	With the help of diagram explain bulk polymerization of styrene.	[06]
		Or	
	(b)	Write a note on unstable prepolymer systems for casting PU rubbers	[06]
Q.6	(a)	Write note on ram injection molding	[06]
	(b)	Write note on compression molding	[06]
		Or	
	(b)	Write note on thermoforming.	[06]

Best of Luck.....

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