Total No. of Questions :6]

SEAT No. :

P1997

[Total No. of Pages :3

[4923] - 304

M.S.C.

PHYSICAL CHEMISTRY

CHP - 313: Polymer Chemistry

(Semester - III) (2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***All questions are compulsory.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic table and calculator is allowed.***
5) ***Neat diagrams must be drawn wherever necessary.***

<u>Physico - Chemical Constants</u>

1.	Avogadro Number	N	=	6.022×10^{23} mol^{-1}
2.	Boltzmann Constant	k	=	1.38×10^{-16} erg K^{-1} molecule^{-1}
			=	1.38×10^{-23} J K^{-1} molecule^{-1}
3.	Planck Constant	h	=	6.626×10^{-27} erg s
			=	6.626×10^{-34} J s
4.	Electronic Charge	e	=	4.803×10^{-10} esu
			=	1.602×10^{-19} C
5.	1 eV		=	23.06 k cal mol^{-1}
			=	1.602×10^{-12} erg
			=	1.602×10^{-19} J
			=	8065.5 cm^{-1}
6.	Gas Constant	R	=	8.314×10^{7} erg K^{-1} mol^{-1}
			=	8.314 J K^{-1} mol^{-1}
			=	1.987 cal K^{-1} mol^{-1}
7.	Faraday Constant	F	=	96487 C equiv^{-1}
8.	Speed of light	c	=	2.997×10^{10} cm s^{-1}
			=	2.997×10^{8} m s^{-1}
9.	1 cal		=	4.184×10^{7} erg
			=	4.184 J
10.	1 amu		=	1.673×10^{-27} kg
11.	Bohr magneton	β_e	=	-9.274×10^{-24} J T^{-1}
12.	Nuclear magneton	β_n	=	5.051×10^{-27} J T^{-1}
13.	Mass of an electron	m_e	=	9.11×10^{-31} kg

P.T.O.

SECTION - I

Q1) Attempt the following: **[10]**

a) Define 'living polymer'.

b) Explain 'degree of polymerization.

c) Compare homo and hetero chain polymers.

d) Define glass transition temperature.

e) Define polydispersity index.

Q2) Attempt any two of the following: **[10]**

a) Explain why a 100% crystalline polymer cannot be made.

b) Write a note on Ziegler - Natta catalyst.

c) Deduce the rate equation in step polymerization in the presence of a catalyst.

d) Explain the Flory theory for polymer solutions.

Q3) Attempt any one of the following: **[5]**

a) Calculate the viscosity of a polymer given,

C = 0.4 g/dl, Huggins constant = 0.33

$k = 1.2 \times 10^{-4}$, $\alpha = 0.2$ M = 120000

b) Compare Voigt and Maxwell models of polymer viscoelasticity.

SECTION - II

Q4) Attempt the following: **[10]**

a) State the principle of ultracentrifugation.

b) Define vulcanization.

c) Explain reinforcement. Give its advantages.

d) State the SI unit of viscocity.

e) Give two applications of conducting polymers.

Q5) Attempt any two of the following: **[10]**

a) Write a note on determination of molecular weight of a polymer by light scattering.

b) Give an accout of extrusion molding.

c) Define calendering, wet spinning and dry spinning.

d) Discuss the effects of radiation on polymers.

Q6) Attempt any one of the following: **[5]**

a) Write a note on XRD analysis of polymers.

b) Discuss DTA in polymer analysis.