CHEM UNIV QP JAN 24 - Questions papers

Chemistry (SRM Institute of Science and Technology)

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B.Tech DEGREE EXAMINATION, JANUARY 2024

First Semester

21CYB101J - CHEMISTRY

(For the candidates admitted during the academic year 2022-2023 onwards)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 75**

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	Among the following complexes, the one that shows zero crystal field stabilization energy (CFSE) is (A) $[Fe(H_2O)_6]^{3+}$ (B) $[Mn(H_2O)_6]^{3+}$ (C) $[Co(H_2O)_6]^{3+}$ (D) $[Co(H_2O)_6]^{2+}$	1	3	1
2.	Choose the correct statement (A) As shielding effect increases electronegativity decreases (B) As shielding effect increases electronegativity increases (C) As shielding effect increases ionization potential increases (D) As positive charge on species increases ionic radii increases	1	1	1
3.	Which of the following will prefer to exist as sulphide? (A) Mg^{2+} (B) Al^{3+} (C) Hg2+. (D) Ca^{2+}	1	3	1
4.	How many unpaired electrons are there in a strong field iron (II) octahedral complex? (A) 0 (B) 1 (C) 3 (D) 5	1	4	1
5.	In a reversible process, the system absorbs 600KJ heat and performs 250KJ work on the sorroundings. What is the increase in the internal energy of the system? (A) 850KJ (B) 600KJ (C) 350KJ (D) 250KJ	1	3	2
6.	Which thermodynamic function relates both enthalpy and entropy? (A) Helmholtz free energy (B) Internal energy (C) Work function (D) Gibbs free energy	1	2	2
7.	Which of the following is the correct criterion for a spontaneous process? (A) ΔS system – ΔS sooroundings (B) ΔS sooroundings > 0 only (C) ΔS system + ΔS sooroundings > 0 (D) ΔS system > 0 only	1	2	2
8.	Volatile oxidation corrosion product of a metal is (A) Fe_2O_3 (B) MoO_3 (C) Fe_3O_4 (D) FeO	1	1	2
9.	The rate of nucleophilic substitution reactions is higher in the presence of_____ (A) Electron withdrawing groups (B) Electron releasing groups (C) Both electron withdrawing and releasing groups (D) Initiator	1	2	3

10.	The product of Dieckmann condensation reaction is (A) Cyclic alcohol (B) β keto esters (C) Cyclic ketone (D) Cyclo alkane	1	1	3
11.	Identify the chiral molecule among the following (A) Isopropyl alcohol (B) 2-pentanol (C) 1-bromo-3- butene (D) Isobutyl alcohol	1	4	3
12.	The IUPAC name for paracetamol is (A) 2-Acetoxybenzoic acid (B) Monohydroxybenzene (C) N-(4- hydroxyphenyl) acetamide (D) Phenyl Salicylate	1	2	3
13.	The type of linkage present in poly urethane is (A) Amide linkage (B) Glycosidic linkage (C) Ester linkage (D) Phospho diester linkage	1	2	3
14.	Which of the following is an initiator molecule in the free radical polymerisation? (A) Sulphuric acid (B) Benzoyl peroxide (C) Potassium permanganate (D) Chromium oxide	1	1	4
15.	Which of the following are thermoplastic? (A) Bakelite (B) Vulcanised rubber (C) Polystyrene (D) Teflon	1	1	4
16.	Markovnikov's law is applied in (A) Addition of propylene with Cl_2 (B) Addition of propylene with HBr (C) Addition of ethylene with Br_2 (D) Addition of ethylene with H_2	1	1	4
17.	The continuous phase of a composite material is known as _____ (A) Dispersed phase (B) Surrounding phase (C) Matrix phase (D) Fiber phase	1	1	5
18.	Which of the following does not combine with fibre to give composites? (A) Metals (B) Ceramics (C) Non-metals (D) Polymers	1	1	5
19.	Obtain a Miller indices of a plane whose intercepts are 4,4 and 2 units along the three axes. (A) (122) (B) (211) (C) (121) (D) (112)	1	3	5
20.	Kevlar is a type of material (A) Glass (B) Thermoplastic (C) Whisker (D) Polymer	1	1	5

PART - B (5 × 8 = 40 Marks)

Answer **all** Questions

		Marks	BL	CO
21.	(a) Calculate CFSE for high spin Td complexes having d^5, d^6, d^7 and d^8 configurations.	8	3	1
	(OR)			
	(b) Describe with suitable examples, the structural isomerism in coordination compounds.			
22.	(a) What is Electro chemical corrosion? Explain the mechanism involved in Hydrogen evolution corrosion with a neat sketch.	8	2	2
	(OR)			
	(b) Define the terms Internal energy and Enthalpy. Derive the expression relating enthalpy and internal energy			

23. (a) Mention the type of isomerism exhibited by the following pairs — 8 — 3
1) 3- methyl pentane & 2,2- dimethyl butane
2) Propanone & Propanal
3) d-lactic acid & l- lactic acid
4) Dipropyl amine & Butyl ethyl amine

(OR)

(b) Give the steps to determine R/S configuration on a Fischer Projection or Cahn Ingold Prelog priority rules to determine R/S configuration on a Fischer Projection

24. (a) Discuss in detail about S_N1 mechanism in detail with an example. — 8 — 2

(OR)

(b) a) Suggest the products when 1, 3 – butadiene reacts with the following and provide suitable equations:
i. Acrylonitrile ii. Styrene (4marks)
b) How are polymers classified based on the method of synthesis and nomenclature? Explain with an example. (4marks)

25. (a) Give the graphical representation of stress-strain relationship of solids and elaborate it in detail. — 8 — 1

(OR)

(b) Discuss the principle and instrumentation of XPS

PART - C (1 × 15 = 15 Marks) — **Marks** — **BL**

Answer **any 1** Questions

26. a) Arrange the following complexes in their increasing order of the wavelength of light absorbed and explain. — 15 — 3
$[Co(NH_3)_6]^{3+}$, $[Co(CN)_6]^{3-}$ and $[Co(H_2O)_6]^{3+}$ (7 Marks)
b) Derive of Nernst equation for the redox potential of a reversible reaction and write its advantages. (8 marks)

27. a) Explain with a neat diagram about the conformational analysis of n-butane. (10 marks) — 15 — 3
b) Give a brief account on 1. Metamerism 2. Enantiomerism in tartaric acid. (5 marks)

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