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PRE BOARD (2024-25)
SUBJECT: CHEMISTRY(THEORY)
CLASS-XII
PAPER CODE- QP12CHEM02PB24

Maximum Marks: 70 **Time Allowed: 3 Hours**

General Instructions:

(1) There are 33 questions in all. All questions are compulsory.
(2) This question paper has five sections: Section A, Section B, Section C, Section D and Section E.
(3) All the sections are compulsory.
(4) **Section A** contains sixteen questions, twelve MCQ and four Assertion Reasoning based of 1 mark each, **Section B** contains five questions of two marks each.
(5) **Section C** contains seven questions of three marks each
(6) **Section D** contains two case study-based questions of four marks each
(7) **Section E** contains three long answer questions of five marks each.
(8) There is no overall choice. However, an internal choice has been provided in one question in Section B, one question in Section C, one question in each CBQ in Section D and all three questions in Section E. You have to attempt only one of the choices in such questions.
(6) Use of calculators is not allowed.

	SECTION-A	
Q.1	**An increase in the conductivity equivalent of a solid electrolyte with dilution is primarily due to** a. increased ionic mobility of ions b. 100 percent electrolyte ionisation with natural dilution c. increase in both ion numbers and ionic mobility d. A rise in ion counts	1
Q.2	**Which of the following observations is incorrect about the order of a reaction?** a. Order of a reaction is always a whole number b. The stoichiometric coefficient of the reactants doesn't affect the order c. Order of reaction is the sum of power to express the rate of reaction to the concentration terms of the reactants. d. Order can only be assessed experimentally	1
Q.3	**A catalyst alters, which of the following in a chemical reaction?** a. Entropy b. Enthalpy c. Internal energy d. Activation energy	1
Q.4	**The number of unpaired electrons in gaseous species of Mn^{3+}, Cr^{3+} and V^{3+} respectively are:** a. 4, 4 and 2 b. 3, 3 and 2 c. 4, 3 and 2 d. 3, 3 and 3	1
Q.5	**A chelating agent has two or more than two donor atoms to bind to a single metal ion. Which of the following is not a chelating agent?** a. Thiosulphato b. Oxalato c. Glycinato d. Ethane-1,2-diamine	1

Q.6	**IUPAC name of $[Pt(NH_3)_2Cl(NO_2)]$ is** a. Platinum diamminechloronitrite b. Chloronitrito-N-ammineplatinum (II) c. Diamminechloridonitrito-N-platinum (II) d. Diamminechloronitrito-N-plantinate (II)	1
Q.7	**Which of the following undergoes nucleophilic substitution exclusively by S_N1 mechanism?** a. Benzyl Chloride b. Ethyl chloride c. Chlorobenzene d. Isopropyl chloride	1
Q.8	**When phenol is treated with excess bromine water it gives** a. m-bromophenol b. o- and p-bromophenol c. 2,4-dibromophenol d. 2,4,6-tribromophenol	1
Q.9	**Dehydration of alcohol is an example of** a. addition reaction b. elimination reaction c. substitution reaction d. redox reaction	1
Q.10	**Out of the following, The strongest base in the aqueous solution is** a. Methylamine b. Dimethylamine c. Trimethylamine d. Aniline	1
Q.11	**Which of the following is true for the basicity of amines?** (a) Alkylamines are generally less basic than arylamines because N is sp hybridised (b) Arylamines are generally more basic than alkylamines due to aryl group (c) Arylamines are generally less basic than alkylamines due to delocalisation of lone pair of electrons in the benzene ring (d) Alkylamines are generally less basic than arylamines because lone pair of electrons on N in the arylamines are not delocalised in the benzene ring	1
Q.12	**Pick the incorrect statement** A. Sucrose is a disaccharide B. Uracil is a pyrimidine C. Glycine is a sulphur containing amino acid D. Cellulose is a polysaccharide	1
	For Questions 13 to 16, two statements are given –one labelled Assertion (A) and other labelled Reason (R). Select the correct answer to these questions from the options as given below. **a) If both Assertion and Reason are true and Reason is correct explanation of Assertion.** **b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.** **c) If Assertion is false but Reason is true.** **d) If both Assertion and Reason are false.**	
Q.13	**Assertion: Starch is the storage polysaccharide in plants.** **Reason: Starch is a polymer of β- glucose**.	1
Q.14	**Assertion: Phenol on oxidation with chromic acid gives benzoquinone.** **Reason: Pure phenol is colourless but turn pink due to oxidation to phenoquinone.**	1
Q.15	**Assertion: The metals of 4d and 5d greater enthalpies of atomisation than the**	1

	corresponding elements of the 3d series. **Reason: The metal-metal bond in 4d and 5d series are stronger than those in the 3d series.**	
Q.16	**Assertion: Order of a reaction with respect to any reactant can be zero, positive negative of fractional.** **Reason: Rate of a reaction cannot decrease with increase in concentration of a reactant or a product.**	1
	SECTION-B	
Q.17	**What is the significance of Henry's Law constant K_H?**	2
Q.18	**How will the pH of brine (NaCl solution) be affected when it is electrolysed?**	2
Q.19	**Transition elements show high melting points. Why?**	2
Q.20	**Out of o-and p-dibromobenzene which one has a higher melting point and why?**	2
Q.21	**α Helix is a secondary structure of proteins formed by twisting the polypeptide chain into right-handed screw-like structures. Which type of interactions is responsible for making the α -helix structure stable?** **OR** **How do you explain the presence of five -OH groups in glucose molecules?**	2
	SECTION-C	
Q.22	**Define the terms specific conductance, molar conductance and equivalent conductance.**	3
Q.23	**Why on dilution the Λ_m of CH_3COOH increases drastically, while that of CH_3COONa increases gradually?**	3
Q.24	**Mention any three processes where transition metals act as catalysts.** **OR** **On the basis of Lanthanoid contraction, explain the following** **(i) Nature of bonding in Lu_2O_3 and La_2O_3** **(ii) Trends in the stability of oxo salts of lanthanides from La to Lu.** **(iii) Stability of the complexes of lanthanides.**	3
Q.25	**Name the alkene which will yield 1-chloro-1-methylcyclohexane by its reaction with HCI. Write the reactions involved.**	3
Q.26	**Write steps to carry out the conversion of phenol to aspirin**.	3
Q.27	**Give the structure of the following compounds.** **(i) 4- Nitro Propiophenone** **(li) 2-Hydroxy Cyclopentanecarbaldehyde** **(iii) Phenyl acetaldehyde**	3
Q.28	**Enumerate the reactions of D-Glucose, which its open-chain structure cannot explain.**	3
	SECTION-D **Case Study Based Questions**	
Q.29	**Read given passage and answer the questions that follow:** **Chemical kinetics deals with rate of chemical reactions, how fast reactants get used up or how fast products are formed in the reaction. Differed chemical reactions have different speed. Rate of reaction depends upon concentration of reactants, temperature, pressure especially in gaseous reactions and presence of catalyst. Chemical reaction takes place as a results of collision between reacting molecules. The rate of reaction does not depend upon total number of collisions rather it depends upon number of effective collisions. In a redox reaction, if E° cell is +ve, *D*G° will be –ve and 'K' equilibrium constant will be high i.e. products formed will be more than the reactants.** **a) k (The rate constant), (Activation Energy) Eaand 'A' (Arrhenius constant) are 3 × 10 –4 s –1,104.4 kJ mol –1 and 6.0 × 1014 S –1 respectively. What is value of 'k ' when T→ ∞?** b) **What is meant by activation energy?** **c) What does $e^{-Ea/RT}$ represent?**	4

	d) If $Fe3+ + 2I^- \rightarrow Fe^{2+} + I_2$ has E° = 0.24V, what is the value of log K? What does value of 'K' indicate? OR **What type of molecules undergo effective collisions?**	
Q.30	**Read the passage given below and answer the following questions:** **The amines are basic in nature due to the presence of a lone pair of electron on N-atom of the -NH2 group, which it can donate to electron deficient compounds. Aliphatic amines are stronger bases than NH3 because of the +1 effect of the alkyl groups. Greater the number of alkyl groups attached to N-atom, higher is the electron density on it and more will be the basicity. Thus, the order of basic nature of amines is expected to be 3° > 2° > 1°, however the observed order is 2° > 1° > 3°. This is explained on the basis of crowding on N-atom of the amine by alkyl groups which hinders the approach and bonding by a proton, consequently, the electron pair which is present on N is unavailable for donation and hence 3° amines are the weakest bases. Aromatic amines are weaker bases than ammonia and aliphatic amines. Electron -donating groups such as -CH3 , -OCH3 , etc. increase the basicity while electron-withdrawing substitutes such as -NO2 , -CN, halogens, etc. decrease the basicity of amines. The effect of these substituents is more at p than at m-positions.** **The following questions are multiple choice questions. Choose the most appropriate answer:** **(i) Which one of the following is the strongest base in aqueous solution?** **(a) Methyl amine (b) Trimethyl amine (c) Aniline (d) Dimethyl amine** **(ii) Which order of basicity is correct?** **(a) Aniline> m-toluidine > o-toluidine (b) Aniline> o-toluidine > m-toluidine (c) o-toluidine> aniline> m-toluidine (d) o-toluidine < aniline < m-toluidine** **(iii) What ts the decreasing order of basicity of primary, secondary and tertiary ethylamines and NH3?** **(a) NH3 > C2H5NH2 > (C2H5)2NH > (C2H5)3N** **(b) (C2H5)3N> (C2H5)2NH > C2H5NH2 > NH3** **(c) (C2H5)2NH >C2H5NH2 > (C2H5)3N > NH3** **(d) (C2H5)2NH> (C2H5)3N > C2H5NH2 > NH3** **(iv) Choose the correct statement.** **(a) Methylamine is slightly acidic.** **(b) Methylamine is less basic than ammonia.** **(c) Methylamine is a stronger base than ammonia.** **(d) Methylamine forms salts with alkalie**	4
	SECTION-E	
Q.31	**Using Raoult's law, explain how the total vapour pressure over the solution is related to the mole fraction of components in the following solutions.** **(i) $CHCl_3$ (*l*) and CH_2Cl_2(*l*) (ii) NaCl(s) and H_2O (*l*)** OR **Explain the terms ideal and non-ideal solutions in the light of forces of interactions operating between molecules in liquid solutions.**	5
Q.32	**$CoSO_4CI.5NH_3$ exists in two isomeric forms 'A' and 'B'. Isomer 'A' reacts with $AgNO_3$ to give white precipitate, but does not react with $BaCl_2$. Isomer 'B' gives white precipitate with $BaCl_2$ but does not react with $AgNO_3$. Answer the following questions.** **(i) Identify 'A' and 'B' and write their structural formulas.** **(ii) Name the type of isomerism involved.** **(iii) Give the IUPAC name of 'A' and 'B'.** **OR**	5

	Using valence bond theory, explain the following in relation to the complexes given below: **$[Mn(CN)_6]^{3-}$, $[Co(NH_3)_6]^{3+}$, $[Cr(H_2O)_6]^{3+}$, $[FeCl_6]^{4-}$** **(i) Type of hybridisation.** **(ii) Inner or outer orbital complex.** **(iii) Magnetic behaviour.** **(iv) Spin only magnetic moment value**	
Q.33	**Write down functional isomers of a carbonyl compound with molecular formula C_3H_6O. Which isomer will react faster with HCN and why? Explain the mechanism of the reaction also. Will the reaction lead to the completion with the conversion of the whole reactant into product reaction conditions? If a strong acid is added to the reaction mixture, what will be the effect on the concentration of the product and why?** **OR** **When liquid ′A′ is treated with a freshly prepared ammonical silver nitrate solution, it gives a bright silver mirror. The liquid forms a white crystalline solid on treatment with sodium hydrogen sulphite. Liquid ′B′ also forms a white crystalline solid with sodium hydrogen sulphite, but it does not give a test with ammoniacal silver nitrate. Which of the two liquids is aldehyde? Write the chemical equations of these reactions also.**	5