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FOR MEGHALAYA CLASS 12 PREPARATION

MBOSE Class 12 Sample Question Paper 2027 Chemistry

EXAM	YEAR	TYPE	SUBJECT
Meghalaya Class 12	2027	Sample Paper	Chemistry

Sample Question Paper
Subject: Chemistry
Class: XII
Full Marks: 70 Time: 3hours

GENERAL INSTRUCTIONS:
Read the following instructions carefully.
1. There are 33 questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 short answer questions carrying 2 marks each.
4.SECTION C consists of 7 short answer questions carrying 3 marks each.
5.SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. All questions are compulsory.

Q. No.		Marks
	Section- A Question 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to the questions.	
1	The maximum amount of solute that can be dissolved in a specified amount of a given liquid solvent does not depend upon (a) Temperature (b) Nature of the solute (c) Nature of the solvent (d) Pressure	1
2	Which of the following forms an ideal solution? (a) C_2H_5OH and H_2O (b) HNO_3 and H_2O (c) $CHCl_3$ and CH_3COCH_3 (d) $C_6H_5CH_3$ and C_6H_6	1
3	Which plot can give the value of activation energy? (a) K vrs T (b) $\frac{1}{K}$ vrs T (c) logK vrs $\frac{1}{T}$ (d) C vrs $\frac{1}{T}$	1
4	For the reaction: $H_2(g) + Br_2(g) \longrightarrow 2HBr(g)$ The reaction rate is: Rate= $K[H_2][Br_2]^{3/2}$ Which of the following statement is true for the reaction? (a) the reaction is of second order. (b) the molecularity of the reaction is $\frac{3}{2}$ (c) the unit of K is sec^{-1} (d) the molecularity of the reaction is 2.	1

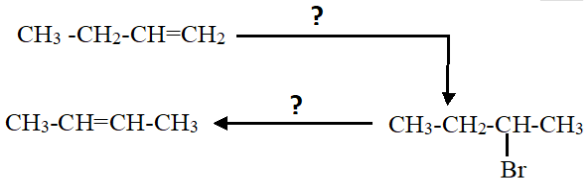
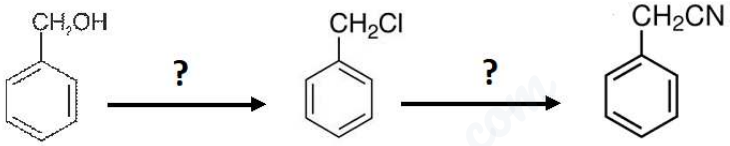
5	Which of the following has the maximum number of unpaired electrons? (a) Mg^{2+} (b) Ti^{3+} (c) V^{3+} (d) Fe^{3+}	1
6	Which of the following compounds is expected to be coloured? (a) $AgSO_4$ (b) CuF_2 (c) CuCl (d) MgF_2	1
7	The product of acid-catalysed hydration of 2- phenylpropene is: (a) 2-phenyl propan-2-ol (b) 2-phenylpropan-1-ol (c) 3- phenylpropan-2-ol (d) 1-phenylpropan-2-ol	1
8	Among the following compounds, strongest acid is: (a) HC≡CH (b) C_6H_6 (c) CH_3COCH_3 (d) CH_3OH	1
9	The correct order of decreasing acidity of nitrophenols will be: (a) m-nitrophenol > p-nitrophenol > o-nitrophenol (b) o-nitrophenol > m-nitrophenol > p-nitrophenol (c) p-nitrophenol > m-nitrophenol > o-nitrophenol (d) p-nitrophenol > o-nitrophenol > m-nitrophenol	1
10	A strong base can abstract α- hydrogen from: (a) Ketone (b) Alkane (c) Alkene (d) Amine	1
11	Benzaldehyde and acetone can be best distinguished using: (a) Fehling's Test (b) Sodium hydroxide solution (c) 2, 4, - DNP (d) Tollen's reagent.	1
12	Which of the following combination of aldehydes give cross Cannizzaro's reaction? (a) CH_3CHO and HCHO (b) C_6H_5 CHO and CH_3CHO (c) C_6H_5CHO and HCHO (d) all of these	1
	Assertion and Reason type questions: For the following questions, 13 to 16 a statement of Assertion (A) and followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.	
14	Assertion (A): Molar conductivity of a weak electrolyte at infinite dilution	1

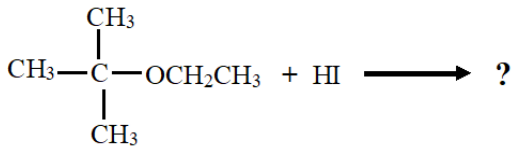
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	cannot be determined experimentally. Reason (R): Kohlrausch's law helps to find the molar conductivity of a weak electrolyte at infinite dilution. Alternatives: (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A) (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A) (c) Assertion (A) is true but Reason (R) is false (d) Both Assertion (A) and Reason (R) are false	
15	Assertion (A): S_N2 reaction proceeds with inversion of configuration. Reason (R): S_N2 reaction occurs in a single step. (a) Both Assertion (A) and Reason ® are true and Reason (R) is the correct explanation of Assertion (A) (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A) (c) Assertion (A) is true but Reason (R) is false (d) Both Assertion (A) and Reason (R) are false	1
16	Assertion (A): Anilinium chloride is more acidic than ammonium chloride. Reason (R): Anilinium ion is resonance stabilized. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A) (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A) (c) Assertion (A) is true but Reason (R) is false (d) Both Assertion (A) and Reason (R) are false	1
	Section- B Question No 17 to 21 are very short questions carrying 2 marks each.	
17	Either (A) Calculate the mole fraction of ethylene glycol ($C_2H_6O_2$) in aqueous solution containing 20% ethylene glycol by mass. Or (B) The vapour pressure of a 5% aqueous solution of a non-volatile organic substance at 373 K is 745mm. Calculate the molar mass of the solute.	2 2
18	Either (A) A first order reaction takes 40 minutes for 30% completion. Calculate its half life. Or (B) A first order reaction takes 69.3 minutes for 50% completion. Calculate the time required for 80% completion of this reaction.	2 2
19	Either (A) Draw *cis* and *trans* isomers of the complex $[CrCl_2(Ox)_2]^{-3}$ and predict which isomers is optically active and why? Or	½x4=2

	(B)With the help of Crystal Field Theory, predict the number of unpaired electrons in the complex $[Fe(H_2O)_6]^{2+}$ (C) Why NH_4^+ ion does not act as a Ligand?	1 1
20	Either (A) Arrange the following compounds in increasing order of their reactivity towards S_N2 mechanism: 1-bromo- 3 methyl butane, 2-bromo-2 methyl butane, 2-bromo-3 methyl butane. (B) Why Grignard's reagent should be prepared under anhydrous condition? Or (C) How would you convert 1-bromo propane to butanoic acid?	1 1 2
21	Either (A) How would you convert chloroethane to propan-1-amine? Or (B)Arrange the following in their increasing order of solubility in water CH_3NH_2, $C_6H_5NH_2$, $(C_2H_5)_2NH$, $C_2H_5NH_2$ (C) Give one test to distinguish between methylamine and dimethylamine	2 1 1
	Section- C Question No. 22 to 28 are short answer questions, carrying 3 marks each	
22	Either (A) What are colligative properties? (B) Calculate the mass percentage of aspirin ($C_9H_8O_4$) and acetonitrile (CH_3CN) when 6.5g of $C_9H_8O_4$ is dissolved in 450g of CH_3CN. Or (C) Why osmotic pressure is considered to be a colligative property? (D) 200 cm^3 of an aqueous solution of a protein contains 1.26 g of the protein. The osmotic pressure of this solution at 300K is found to be 2.57 x 10^{-3} bar. Calculate the Molar mass of the protein. (R= 0.083 L bar $K^{-1}mol^{-1}$)	1 2 1 2
23	(A) Which electrode is used as a reference half cell (as anode or cathode) to calculate the standard reduction potential of a given half cell? (B) Write all the chemical reactions occurring during the rusting of iron.	1 2
24	Either (A) For a zero-order reaction, $R \rightarrow P$, derive the integrated rate equation and find its half-life ($t_{½}$) time period.	2+1=3

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	Or (B)What is the order of a reaction whose rate constant has same unit as the rate of reaction? (B) Time required to decompose SO_2Cl_2 to half its initial amount is 60 minutes. If the decomposition is a first order reaction, calculate the rate constant of the reaction.	 1 2
25	(A) Write down the reagent that would bring about the following conversions: (i)  ii)  	1+1=2
	(B) Between the following compounds in each set which molecule is reactive towards S_N2 mechanism. (i) $CH_3CH_2\underset{\displaystyle Br}{\underset{\vert}{C}}HCH_3$ OR $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{\vert}{\underset{\vert}{C}}}}-Br$ (ii) $CH_3-\underset{\displaystyle CH_3}{\underset{\vert}{CH}}-CH_2CH_2Br$ OR $CH_3CH_2-\underset{\displaystyle H}{\overset{\displaystyle Br}{\overset{\vert}{\underset{\vert}{C}}}}-CH_2CH_3$	½+½=1

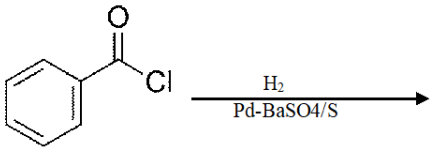
26	(A) Why propanol has higher boiling point than that of butane? (B) Complete the following reactions: (i)  (ii) $CH_3CH_2OH \xrightarrow[573\ K]{Cu}$?	1 1+1=2
27	Answer the following: (A) Why do primary amines have higher boiling points than tertiary amines? (B) Explain why aniline does not undergo Friedel Craft Reaction? (C) Give equation for the conversion of chloroethane into propan-1-amine.	1x3=3
28	Answer the following: (A) Why vitamin-C cannot be stored in the body? (B) What is peptide linkage? (C) Name the central metal atom present in Chlorophyll and in Haemoglobin.	1x3=3
	SECTION-D Question No.29 and 30 are case based question carrying 4 marks each.	
29	All proteins are made up of α- amino acids which act as the building blocks. α-amino acids that are synthesized in the body are known as non-essential α-amino acids while the one which the body fails to synthesize, are called essential α- amino acids. All of them exist as dipolar ions also known as zwitterions. For all the α- amino acids, there is a certain pH of the medium known as isoelectric point at which the dipolar ions behave as electrically neutral species. In acidic medium, the ions migrate towards cathode while in basic medium, it migrates towards anode on passing electric current. Based on the information provided above, answer the following questions: i. What is the difference between essential and non-essential amino acids? ii. What are zwitterions? iii. The isoelectric point of an amino acid is: (choose the correct option) (a) The pH at which it exists in basic form (b) The pH at which it exists in basic form (c) The pH at which it exists in zwitter ion form (d) The pH at equals to its pKa iv. Which of the following is basic amino acid?	1x4=4

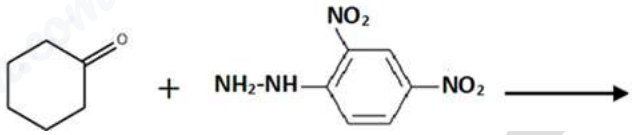
	(a) Aspartic acid (b) Histidine (c) Valine (d) Leucine	
30	Different theories have been put forward to explain the geometries of co-ordination compounds. Out of them, the most practical is the valence bond theory which is based on the concept of hybridization. According to this, the complexes with Coordination number 4 may be either tetrahedral (sp^3) hybridized or square planar (dsp^2) hybridized in nature. Similarly in the octahedral complexes, the metal atom or ion is either sp^3d^2 hybridised (outer orbital complex) or $d^{2s}p^3$ hybridised (inner orbital complex). Further, these complexes may be either paramagnetic if one or more orbitals are half filled and diamagnetic if all are filled in nature. Based on the information provided above, answer the following questions: (i) Which of the following options is correct in the case of $[Fe(CN)_6]^{4-}$ complex? (a) diamagnetic (b) Octahedral (c) ds^2p^3 hybridised (d) all are correct (ii)Which one of the following has the highest paramagnetic character? $[Cr(H_2O)_6]^{3+}$ or $[Fe(H_2O)_6]^{2+}$ (iii) Give an example of a complex having tetrahedral geometry and paramagnetic in nature. (iv) Which one is an inner orbital complex? $[Co(NH_3)_6]^{3+}$ or $[CoF_6]^{3-}$	1x4=4
	SECTION- E Question No. 31 to 33 are long answer type questions carrying 5 marks each	
31	Either (A) Calculate the amount of electricity required to reduce 1 mole of MnO_4^- ion to Mn^{2+} ion. (B) Why does the conductivity of a solution decrease with dilution? (C) What is the difference between electrochemical cell and electrolytic cell? (D) Calculate the EMF of the cell in which the following reaction takes place:	1 1 1 2

	$Ni\ (s) + 2\ Ag^{+}\ (0.002\ M) \longrightarrow Ni^{2+}\ (0.160M) + 2Ag\ (s)$ (Given $E^{\circ}_{cell} = 1.05$ V) Or (E) Conductivity of 0.00241M Acetic Acid is 7.896 x10^{-5}S cm^{-1}. Calculate its molar conductivity. If Λ^{0}_{m} for acetic acid is 390.5 $Scm^{2}mol^{-1}$, what is its dissociation constant? (F) Name two materials, other than hydrogen, that can be used as fuels in fuel cells. (G) How much electricity in terms of Faraday is required to produce 20g of Ca from molten $CaCl_2$?	1+2=3 ½+½=1 1
32	Either (A) What do you mean by Lanthanoid contraction? (B) Mn^{2+} compounds are more stable than Fe^{2+} compounds towards oxidation to their +3 state. Explain. (C) Why do transition elements show variable oxidation states? (D) Why are Zn^{2+} salts while, whereas Cu^{2+} salts are coloured? Or (E) Why do the highest oxidation state of a metal is exhibited by its Fluorides and Oxides only? (F) Write the highest oxidation state shown by an element with atomic number 23 (G) Name an important alloy which contain some of the Lanthanoid metals. (H) Write the reaction of acidified potassium dichromate with (i) KI and (ii) $FeSO_4$.	1 1+1=2 1 1 1 1 1 1 1+1=2
33	Either (A) Arrange the following compounds in increasing order of acid strength: Benzoic acid; 4- Nitrobenzoic acid; 3,4- Dinitrobenzoic acid; 4- methoxy benzoic acid. (B) Which of the following compounds would undergo aldol condensation Methanal or Ethanal. Write the structure of the expected product of aldol condensation of the compound.	1 1+1=2

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(C) Write the structures of products of the following reactions: 1+1=2

(i) 

(ii) 

Or

(D) Convert Toluene to benzaldehyde. 1

(E) Why are the boiling points of Carboxylic acids higher than the corresponding alcohols? 1

(F) Why is α-hydrogen in carbonyl compounds acidic? 1

(G) Write the structures of compounds A, B, C and D in the following reactions: ½x4=2

(i) $C_6H_5Br \xrightarrow[\text{Dry ether}]{Mg} A \xrightarrow[(ii)\ H_3O^+]{(i)\ CO_2} B$

(ii) $CH_3CH=C(CH_3)_2 \xrightarrow[(ii)\ Zn/\ H_2O]{(i)\ O_3} C + D$

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