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CLASS – 12(CHEMISTRY)

Pre- board – 1 (2020-2021)

M.M. :70 **TIME: 3 Hours**

GENERAL INSTRUCTIONS: read the following instructions carefully.

(a) There are 33 questions in this question paper. All questions are compulsory
(b) Section A: Question numbers 1 to 2 are case- based questions having four MCQs or Reason Assertion type based on the given passage each carrying 1 mark.
(c)Section A: Question 3 to 16 are MCQs and Reason type questions carrying 1 mark each.
(d) Section B: Question 17 to 25 are short answer questions and carry 2 marks each.
(e) Section C: Question number 26 to 30 are short answer questions and carry 3 marks each.
(f) Section – D: Question numbers 31 to 33 are long answer questions and carry 5 marks.
(g) There is no overall choice. However, internal choices have been provided.
(h) Use of calculators and log tables is not permitted.

SECTION –A (OBJECTIVE TYPE)

1. Read the passage given below and answer the following questions:

Ethers are inert and stable compounds. It can be symmetrical and unsymmetrical .Both symmetrical and unsymmetrical ether can be prepared by the Williomson synthesis reaction.

$$R\text{-}X + RONa \rightarrow ROR + NaX$$

Ethers can also be prepared by dehydration of alcohol. But we can get only symmetrical ether by this method.The formation of ether follow SN_2 mechanism.

Alkoxy group (- OR) is ortho, para directing and activates the aromatic ring towards electrophillic substitution .

The following questions are multiple choice question. Choose the most appropriate answer:

1(i). What is the main product for the reaction?

$(CH_3)_3CBr + Na\text{-}OCH_3 \text{ ------}\rightarrow$

(a) $(CH_3)_2C{=}CH_2$

(b) $(CH_3)_3C\text{-}OCH_3$

(c) $(CH_3)_3C{=}CH_2$

(d) $(CH_3)_3C\text{-}ONa$

1. (ii). Write the product of Friedal Craft Alkylation reaction of anisole?

(a) 3-Methoxy- toluene

(b) 2- Methoxy benzene and 4- Methoxy benzene

(c) 2- Methoxy toluene and 4- Methoxy toluene

(d) 3- Methoxy toluene

1. (iii) . What is the IUPAC name of the compound?

$C_6H_5O(CH_2)_6\text{-}CH_3$

(a) 1- Heptoxybenzene

(b) Benzeneheptanoxy

(c) 1- Phenoxyheptane

(d) 1- Methylhexanebenzene

1(iv).p. What is the product of reaction

$(CH_3)_3C\text{-}OC_2H_5 + HI$ ------→

(a) $(CH_3)_3C\text{-}OH + C_2H_5I$

(b) $(CH_3)_3C\text{-}H + C_2H_5OI$

(c) $(CH_3)_3C\text{-}I + C_2H_5OH$

(d) $(CH_3)_2CH + CH_3\text{-}C_2H_5\text{-}I$

OR

1.(iv). q. What is the product of the reaction:-

$CH_3\text{-}CH_2\text{-}CH_2\text{-}O\text{-}CH_3 + HI$ ----→

(a) $CH_3\text{-}CH_2\text{-}CH_2\text{-}OH + CH_3I$

(b) $CH_3\text{-}CH_2\text{-}CH_2\text{-}I + CH_3OH$

(c) $CH_3\text{-}CH_2\text{-}I + CH_3\text{-}O\text{-}CH_3$

(d) $CH_3\text{-}I + CH_3\text{-}CH_2\text{-}O\text{-}CH_3$

2. Read the passage given below and answer the following questions:

Colloidal solution contain the particles of size between 1- 1000 nm. Colloidal solutios are of two types. One is lyophillic sol and other is lyophobic sol. Lyophilic sol is more stable as compare to lyophobic sol. During the preparation of colloidal sol, some electrolyte we have to add. But during purification of these colloidal solution , we have to remove

the extra amount of electrolytes. Charges are present on the colloidal particles which is responsible for the stability of these colloidal sol. But if we add the oppositely charged electrolyte, then coagulation will occur and the colloidal sol will become unstable.

In these questions (Q.No. 2.(i)-(iv), a statement of assertion followed by a statement of reason is given. choose the correct answer out of the following choices.

(a) Assertion and reason both are correct and reason is correct explanation of assertion.
(b) Both assertion and reason are correct statements but reason is not correct explanation of assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

2. (i) Assertion: An ordinary filter paper impregnated with colloidian solution stops the flow of colloidal particles.

Reason: Pore size of the filter paper becomes more than the size of colloidal particles.

2. (ii).p. Assertion: Colloidal solutions show colligative properties.

Reason: Colloidal particles are larger in size.

OR

2.(ii).q. Assertion: Colloidal solutions do not show Brownian motion.

Reason: Brownian motion is responsible for stability of sols.

2. (iii) Assertion : Lyophillic sols are more stable than lyophobic sols.

Reason : Lyophillic sol contains charge on particles whereas no charge is present on the particles of lyophobic sols.

2. (iv) Assertion : Coagulation power of Al^{3+} is more than Na^{+}.

Reason : Greater the valency of the flocculating ion added, greater is its power to cause precipitation (Hardy Schulze rule).

Following questions (Q. No. 3- 11) are multiple choice questions carrying 1 mark each:

3. If limiting molar conductivity of Ca^{2+} and Cl^{-} are 119.0 and 76.3 S cm^2 mol^{-1}, then the value of limiting molar conductivity of $CaCl_2$ will be
(a) 195.3 S cm^2 mol^{-1}
(b) 271.6 S cm^2 mol^{-1}
(c) 43.3 S cm^2 mol^{-1}
(d) 314.3 S cm^2 mol^{-1}.

4.p. On oxidation with a mild oxidising agent like Br_2/H_20, the glucose is oxidized to
(a) saccharic acid
(b) glucaric acid
(c) gluconic acid
(d) valeric acid

OR

4.q. The melting points of amino acids are higher than the corresponding halo-acids because
(a) amino acids exist as zwitter ions resulting in strong dipole-dipole

attraction
(b) amino acids are optically active
(c) due to higher molecular mass of $-NH_2$ group molecular mass of amino acids is higher
(d) they interact with water more than halo-acids and have salt like structure

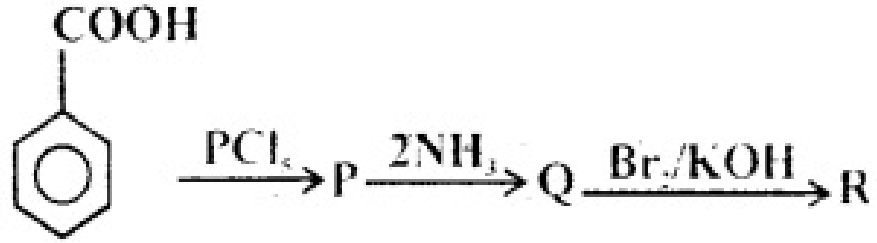
5. Osmotic pressure of a solution is 0.0821 atm at a temperature of 300 K. The concentration in moles/litre will be
(a) 0.33
(b) 0.666
(c) 0.3×10^{-2}
(d) 3

6.p. Which one of the following characteristics of the transition metals is associated with higher catalytic activity?
(a) High enthalpy of atomisation
(b) Paramagnetic behaviour
(c) Colour of hydrate ions
(d) Variable oxidation states

OR

6.q. The correct order of $E_0^{M2+/M}$ values with negative sign for the four successive elements Cr, Mn, Fe and Co is
(a) Fe > Mn > Cr > Co
(b) Cr > Mn > Fe > Co
(c) Mn > Cr > Fe > Co
(d) Cr > Fe > Mn > Co

7.p. What is the end product in the following sequence of reactions?



(a) Aniline
(b) Phenol
(c) Benzene
(d) Benzenediazxonium chloride

OR

7.q. Among the following:
I. CH_3NH_2
II. $(CH_3)_2NH$
III. $(CH_3)_3N$
IV. $C_6H_5NH_2$
Which will give the positive carbylamine test?
(a) I and II
(b) I and IV
(c) II and IV
(d) II and III

8.p. The correct IUPAC name of the coordination compound $K_3[Fe(CN)_5NO]$ is
(a) Potassium pentacyanonitrosylferrate (II)
(b) Potassium pentacyanonitroferrate (II)
(c) Potassium nitritopentacyanoferrate (IV)
(d) Potassium nitritepentacynanoiron (II)

OR

8.q. Correct formulae of tetraaminechloronitroplatinum (IV) sulphate can be written as
(a) $[Pt(NH_3)_4\ (ONO)\ Cl]SO_4$
(b) $[Pt(NH_3)_4Cl_2NO_2]_2$
(c) $[Pt(NH_3)_4\ (NO_2)\ Cl]SO_4$
(d) $[PtCl(ONO)NH_3(SO_4)]$

9. Which of the following has magnetic moment value of 5.9 BM?
(a) Fe^{2+}
(b) Fe^{3+}
(c) Ni^{2+}
(d) Cu^{2+}

10. Identify X and Y in the following sequence

$$C_2H_5Br \xrightarrow{X} \text{Product} \xrightarrow{Y} C_3H_7NH_2$$

(a) X = KCN, Y = $LiAlH_4$
(b) X = KCN, Y = H_3O^+
(c) X = CH_3Cl, Y = $AlCl_3$, HCl
(d) X = CH_3NH_2, Y = HNO_2

11. Examine the given defective crystal

A^+	B^-	A^+	B^-	A^+
B^-	0	B^-	A^+	B^-
A^+	B^-	A^+	0	A^+
B^-	A^+	B^-	A^+	B^-

(a) It is Frenkel defect and density will increase

(b) It is Schottky defect and density will decrease

(c) It is Frenkel defect and density will decrease

(d) It is Schottky defect and density will increase

In the following questions(Q. No. 12- 16) a statement of assertion followed by a staterment of reason is given. Choose the correct answer out of the following choices.

Note : In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.
(a) Assertion and reason both are correct and reason is correct explanation of assertion.
(b) Both assertion and reason are correct statements but reason is not correct explanation of assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

(e) Both assertion and reason are wrong statements.

12. Assertion(A) : α glucose and β glucose are anomers of each other.
Reason(R) : α and β glucose differ at C-2 position.

13. **Assertion (A):** Both rhombic and monoclinic sulphur exist as S_8 but oxygen exists as O_2.
Reason (R): Oxygen forms pπ-pπ multiple bond due to small size and small bond length but pπ-pπ bonding is not possible in sulphur.

14.p. Assertion : When methyl alcohol is added to water, boiling point of water increases.
Reason : When a volatile solute is added to a volatile solvent elevation in boiling point is observed.

OR

14. q. Assertion : When NaCl is added to water a depression in freezing point is observed.

Reason : The lowering of vapour pressure of a solution causes depression in the freezing point. a

15. **Assertion** (A): Ortho and para isomers of nitro phenol can not be separated by steam distillation.

Reason (R): Both ortho and para isomers of nitro phenol have the similar boiling point.

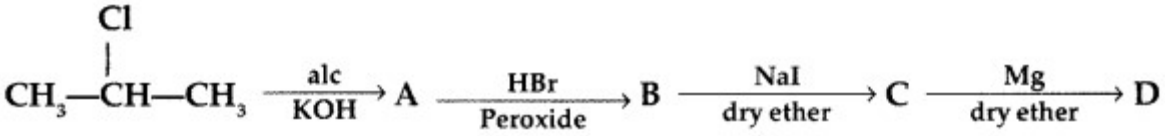
16. **Assertion** (A): Aldehydes and ketones, both react with Tollen's reagent to form silver mirror.

Reason (R): Both, aldehydes and ketones contain a carbonyl group.

SECTION – B

Tht following questions, Q.No. 17-25 are short answer type and carry 2 marks each.

17. Write the structural formula of A, B, C and D in the following sequence of reaction:



OR

17. Chlorobenzene is extremely less reactive towards a nucleophilic substitution reaction. Give two reasons for the same.

18. A solution prepared by dissolving 1.25 g of oil of winter green (methyl salicylate) in 99.0 g of benzene has a boiling point of 80.31°C. Determine the molar mass of this compound. (B.P. of pure benzene = 80.10°C and K_b for benzene = 2.53°C kg mol^{-1}) .

19. Compare the following complexes with respect to structural shapes of units, magnetic behaviour and hybrid orbitals involved in units :
$[Co(NH_3)_6]^{+3}$, $[Cr(NH_3)_6]^{3+}$, $[Ni(CO)_4]$
(At. nos. : Co = 27, Cr = 24, Ni = 28)

OR

19. Explain the following terms giving a suitable example in each case :
(i) Ambident ligand
(ii) Crystal field splitting in an octahedral field

20. The rate constant for a reaction of zero order in A is 0.0030 mol L^{-1} s^{-1}. How long will it take for the initial concentration of A to fall from 0.10 M to 0.075 M?

OR

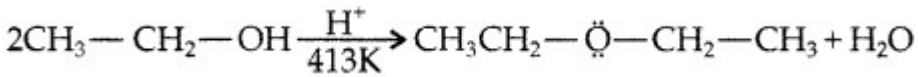
Half-life for a first order reaction 693 s. Calculate the time required for 90% completion of this reaction.

21. (a) For a reaction A + B → P, the rate law is given by,
$r = k[A]^{1/2}[B]^2$.
What is the order of this reaction?
(b) A first order reaction is found to have a rate constant
$k = 5.5 \times 10^{-14}$ s^{-1}. Find the half life of the reaction.

22. Explain the mechanism of acid catalysed hydration of an alkene to form corresponding alcohol.

OR

Explain the mechanism of following reaction.



23. What happens when:

(i) SO_2 gas is passed through an aqueous solution of Fe^{3+} salt?

(ii) XeF_4 reacts with SbF_5?

24. How will you carry out the following conversions :

(i) 2-Bromopropane to 1-bromopropane

(ii) Benzene to p-chloronitrobenzene

25. An element with density 11.2 g cm^{-3} forms a f.c.c. lattice with edge length of 4×10^{-8} cm. Calculate the atomic mass of the element. (Given : $N_A = 6.022 \times 10^{23}$ mol^{-1})

SECTION – C

The following questions, Q.No. 26-30 are short answer type II and carry 3 marks each.

26. Explain the following observations :

(i) Zn^{2+} salts are colourless.

(ii) Copper has exceptionally positive $E_0^{M2+/M}$ value.

(iii) The metallic radii of the third (5d) series of transition elements are virtually the same as those of the corresponding members of the second series.

OR

26. (i) Which metal in the first transition series (3d series) exhibits +1 oxidation state most frequency and why?

(ii) Which of the following cations are coloured in aqueous solutions and why?

$SC^{3+,}$ V^{3+}, Ti^{4+}, Mn^{2+}.

(Atomic no. Sc = 21, V = 23, Ti = 22, Mn = 25)

27. Account for the following :
(i) Primary amines (R-NH_2) have higher boiling point than tertiary amines (R_3N).
(ii) Aniline does not undergo Friedel – Crafts reaction.
(iii) $(CH_3)_2NH$ is more basic than $(CH_3)_3N$ in an aqueous solution.

OR

27. (i) Give reasons :
(a) Aniline is a weaker base than cyclohexyl amine.
(b) It is difficult to prepare pure amines by ammonolysis of alkyl halides.

(ii) Arrange the following in increasing order of basic strength.
Aniline, p-Nitroaniline and p-Toluidine

28. (i) Why does presence of excess of lithium makes LiCl crystals pink?
(ii) Analysis shows that nickel oxide has the formula $\mathbf{Ni_{0.98}\ O_{1.00}}$. What fractions of nickel exist as Ni^{2+} and Ni^{3+} ions?

29. Define the following as related to proteins :
(i) Peptide linkage
(ii) Primary structure
(iii) Denaturation

30. Complete the following chemical reaction equations .

(a)
(*i*) $NaOH$ (cold and dilute) $+ \quad Cl_2 \rightarrow$

(*ii*) XeF_6 (excess) $+ \quad H_2O \rightarrow$

(b) Draw the structures of the following compounds
(i) BrF_3 (ii) XeF_4

SECTION – D

The following questions, Q.No. 31-33 are long answer type and carry 5 marks each.

31. Account for the following:
(i) Bond angle is NH_4^+ is higher than that in NH_3.
(ii) ICl is more reactive than I_2.

(iii) Bond dissociation energy of F_2 is less than that of Cl_2.

(iv) H_2S is more acidic than H_2O.

(v) SF_6 is kinetically inert.

OR

31. Give reasons for the following:
(i) $BiCl_3$ is more stable than $BiCl_5$.

(ii) Bleaching of flowers by Cl_2 is permanent while that of SO_2 is temporary.

(iii) Noble gases have very low boiling points. And out of the noble gases, which noble gas has the lowest temperature.

(iv) Sulphur in vapour state exhibits paramagnetism.

(v) Complete the following reaction:-

$Cl_2 + F_2$ (excess) $\rightarrow$

32. (i) The cell in which the following reaction occurs:

$2Fe^{3+}(aq) + 2I^{-}(aq) \rightarrow 2Fe^{2+}(aq) + I_2(s)$

has $E_o^{Cell} = 0.236$ V at 298 K. Calculate the standard Gibbs energy of the cell reaction. (Given: 1F = 96,500 C mol^{-1})

(ii) Calculate the potential of hydrogen electrode in contact with a solution with pH equal to 10.

(iii) There are two electrolytes A and B. The electrolyte A show small increase in molar conductivity with dilution and electrolyte B show large increase in molar conductivity with dilution. So find out the weak and strong electrolyte out of A and B.

OR

32. (i) A voltaic cell is set up at 25°C with the following half cells :

Ag^{+} (0.001 M) | Ag and Cu^{2+} (0.10 M) | Cu

What would be the voltage of this cell? ($E^0_{cell} = 0.46$ V)

[Given log 10 =1]

(ii) Conductivity of 2.5×10^{-4} M methanoic acid is 5.25×10^{-5} S cm^{-1}. Calculate its molar conductivity, degree of dissociation and dissociation constant.

Given : $\lambda^0(H^+) = 349.5$ Scm^2 mol^{-1}

and $\lambda^0(HCOO^-) = 50.5$ Scm^2 mol^{-1}.

33. (i) An organic compound ‘A’ which has characteristic odour, on treatment with NaOH forms two compounds ‘B’ and ‘C’. Compound ‘B’ has the molecular formula C_7H_8O which on oxidation with CrO_3 gives back compound ‘A’. Compound ‘C’ is the sodium salt of the acid. ‘C’ when heated with soda lime yields an aromatic hydrocarbon ‘D’. Deduce the structures of ‘A’, ‘B’, ‘C’ and ‘D’.

(ii) Give reason :

Electrophilic substitution in Benzoic acid takes place at meta position.

OR

33. Write the reactions involved in the following reactions:

(i) Clemmensen reduction

(ii) Cannizzaro reaction

(iii) Hell-Volhard Zelinsky reaction

(iv) Wolff-Kishner reduction

(v) Etard reaction