

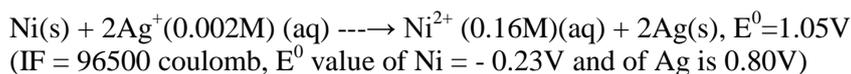
**KENDRIYA VIDYALAYA SANGATHAN
CHEMISTRY (THEORY)
CLASS XII**

Time allowed: 3 Hours

Maximum Marks: 70

General instructions:

- (i) **All** questions are compulsory.
 - (ii) Marks for each question are indicated against it.
 - (iii) Question numbers 1 to 5 are very short answer question and carries 1 mark each.
 - (iv) Question numbers 6 to **10** are short answer question and carries 2 mark each.
 - (v) Question numbers 11 to 22 are also short answer question and carries 3mark each.
 - (vi) Question number 23 is value based carrying 4 marks.
 - (vii) Question numbers 24 to 26 are long answer questions and carries 5marks each.
 - (viii) Use log tables, if necessary. Use of calculators is **not** allowed.
1. On heating crystals of NaCl in sodium vapours, the crystals start exhibiting a yellow colour, *why?*
 2. Give the IUPAC name of following compound-
 $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH(Cl)-CH(Br)-CH}_3$
 3. Arrange the following in increasing order of the acidic character:
 $\text{HCOOH, CH}_2\text{ClCOOH, CF}_3\text{COOH, CCl}_3\text{COOH}$
 4. What is the linkage present between amino acids?
 5. Name any two artificial sweetening reagent.
 6. Explain Kohlrausch's law of independent migration of ions. Mention one application of Kohlrausch's law.
- ‘OR’
- A solution of $\text{Ni(NO}_3)_2$ is electrolysed between platinum electrodes using a current of 5.0 ampere for 20 minutes. What mass of nickel will be deposited at the cathode? (At. Mass of Ni= 58.7)
7. A first order reaction is found to have rate constant,
 $k=5.5 \times 10^{-14} \text{ s}^{-1}$ Find the half life of the reaction?
 8. Write the structures of following species:
 - (i) XeF_2
 - (ii) $\text{H}_2\text{S}_2\text{O}_8$
 9. How would you get
 - (a) Benzene from phenol
 - (b) Salicylaldehyde from phenol.
 10. Explain giving reasons:
 - (i) Propanol has higher b.p. than that of butane.
 - (ii) Phenols are more acidic than alcohols.
 11. Silver metal crystallizes with a face centre cubic lattice. The length of unit cell is found to be $4.077 \times 10^{-8} \text{ cm}$. Calculate atomic radius and density of silver. (atomic mass of Ag = 108u, $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$)
 12. Write the Nernst Equation & Determine the emf of cell in which the following reaction takes place:



13. The rate constant for first order reaction is 60/s. How much time will it take to reduce the concentration of the reaction to 1/10 of its initial value

14. Describe the role of following:

- (i) NaCN in extraction of Silver from silver ore.
- (ii) Iodine in refining of Titanium
- (iii) Cryolite in the metallurgy of aluminium

OR

Describe the principle involved in each of the following processes of metallurgy

- (i) Froth floatation method
- (ii) Electrolytic refining of metals
- (iii) Zone refining of metals

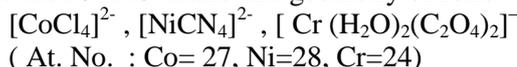
15. Give reasons

- (i) Dinitrogen is inert at room temperature.
- (ii) H_2S is acidic and H_2O is neutral
- (iii) Name two poisonous gases which can be prepared from chlorine gas

16. Complete the following reactions

- i. $\text{Cl}_2 + \text{NaOH}$ (Hot & Conc.) \rightarrow
- ii. NH_3 (excess) + $\text{Cl}_2 \rightarrow$
- iii. $(\text{NH}_4)_2\text{SO}_4 + \text{Ca}(\text{OH})_2$

17. Write the IUPAC name and geometry of following complexes:



18. (a) Why haloarenes are less reactive than the haloalkanes towards nucleophilic substitution?

(b) Why Grignard reagent should be prepared under anhydrous conditions?

(c) p- dichlorobenzene has highest m.p. than those of ortho and meta –isomers?

19. Write a short note on the following:

- (i) HVZ reaction
- (ii) Carbyl amine reaction
- (iii) Ammonolysis

20. a) Where does the water present in the egg go after boiling the egg?

b) What is invert sugar?

c) What are anomers?

21. (a) Write the names and structures of monomers of the following polymers:

- (i) Bakelite
- (ii) Nylon-6,6

(b) Name a polymer used for non-stick kitchen wares. Write the chemical equation involved in its synthesis.

22. (a) Explain following with one example each

- (i) Analgesics
- (ii) Antipyretics

(b) What composition of phenol acts as antiseptic and disinfectant

23. Swapnesh, living in Ooty, was washing clothes in cold water. He found that

the clothes were not getting clean. Geeta, his niece, suggested that he wash the clothes in warm water. Washing of clothes with soaps or detergents is easier in Luke warm water than cold water.

a. Why?

b. What value do you derive from this?

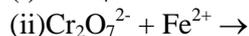
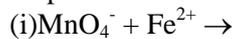
24. (a) State Henry's laws mention some of its applications

(a) Why is freezing point of depression of 0.1M NaCl solution nearly twice than of 0.1M glucose solution?

OR

- (a) (i) State the difference between molarity and molality of solution
(ii) What is a brine solution?
(b) A solution of glycerol (m.M=92 g/mol) in water was prepared by dissolving some glycerol in 500g of water. This solution has a boiling point of 100.420C. What mass of glycerol was dissolved to make this solution? K_b for water=0.5121kg/mol.

25. (a) Complete the following reactions:



(b) How you can prepare $KMnO_4$ from chromite ore . Write down the reactions involved
OR

(a) Assign reasons for the following:

(i) Transition metals have high enthalpy of atomisation.

(ii) Transition metal compounds are coloured.

(iii) Zn ,Cd & Hg are not regarded as transition elements

(b) What is lanthanoid contraction? Mention its consequences.

26. (a) Illustrate the following name reactions:

(i) Cannizzaro reaction

(ii) Clemmensen reaction

(b) How would you obtain the following conversions:

(i) Butanoic acid from Butan -1-ol

(ii) But-2-enal from ethanol

(iii) Toluene to Benzoic Acid

OR

(a) An unknown aldehyde (A) on reacting with alkali gives a β -Hydroxy-aldehyde, which loses water to form an unsaturated aldehyde , 2-butenal. Another aldehyde (B) undergoes disproportionation reaction in the presence of conc. Alkali to form products C and D. C is an arylalcohol with the formula C_7H_8O .

(i) Identify A and B

(ii) Write the sequence of reactions involved.

(b) Give a chemical test to distinguish between phenol and benzoic acid.

.....Best of luck.....

Marking Scheme

Q.No.	Answers	Value Points
1.	Due to F- center.	(1)
2.	2-Bromo-3-chloro octane. .	(1)
3.	$HCOOH < CH_2ClCOOH < CCl_3COOH < CF_3COOH$	(1)
4.	Peptide linkage	(1)
5.	Sucralose, Saccharine Or any other	(1)
6.	Kohlrausch's law	(1)
	Any one application	(1)
7.	$t_{1/2} = 0.693/K$	(1)

- $=0.693/5.5 \times 10^{-14}$ (1/2)
 $=1.26 \times 10^{13}$ Sec (1/2)
8. Correct Structure (1+1)
9. (a) $C_6H_5OH + Zn \text{ Dust} \rightarrow C_6H_6 + ZnO$ (1)
9. (b) $C_6H_5OH + NaOH + CHCl_3 \xrightarrow{H^+} \text{Salicyl aldehyde} + NaCl + H_2O$ (1)
10. (i) Intermolecular H-bonding in butanol, but not in butane (1)
 (ii) Due to stability of phenoxide ion. (1)
11. Given: $A = 4.077 \times 10^{-8} \text{ cm}$, $Z=4$, $M=108 \text{ g mol}^{-1}$, $N_A=6.022 \times 10^{23}$
- $d = Z M / a^3 \cdot N_A$ 1/2
 substitution 1/2
 $d = 10.58 \text{ g cm}^{-3}$ 1/2
 $r = ?$ FORMULA USED 1/2
 substitution 1/2
 $r = 1.44 \times 10^{-8} \text{ cm}$ 1/2
12. Formula used
 $n=2$ 1/2
 substituting the values 1/2
 $E_{\text{cell}} = 0.9142 \text{ V}$ 1/2
13. ($t = \frac{2.303}{K} \log \frac{[R_0]}{[R]}$
- $t = \frac{2.303}{K} \log \frac{[R_0]}{[R]}$
- $\frac{1}{10} [R]$
- 10
- $t = \frac{2.303}{K} \log 10$
- 60
- $t = \frac{2.303}{K} = 3.38 \times 10^{-2} \text{ s}^{-1}$
- 60
14. Role of each 1x 3=3
- Or
- Principle involved 1x 3=3

15.) (i) Due to triple bond present in dinitrogen.
 (ii) The S---H bond is weaker than O---H bond because the size of S atom is bigger than that of O atom. Hence H₂S can dissociate to give H⁺ ions in aqueous solution.
 (iii) Phosgene (COCl₂), tear gas (CCl₃NO₂)
16. (i) $\text{Cl}_2(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{NaOCl}(\text{aq}) + \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l})$ 1
 (ii) $\text{NH}_3 + \text{Cl}_2 \rightarrow \text{NH}_2\text{Cl} + \text{HCl}$ 1
 $\text{NH}_2\text{Cl} + \text{Cl}_2 \rightarrow \text{NHCl}_2 + \text{HCl}$
 $\text{NHCl}_2 + \text{Cl}_2 \rightarrow \text{NCl}_3 + \text{HCl}$
 (iii) $\text{Ca}(\text{OH})_2 + (\text{NH}_4)_2\text{SO}_4 \rightarrow \text{CaSO}_4 + 2(\text{NH}_4)\text{OH}$ 1
17. (i) $[\text{CoCl}_4]^{2-} \rightarrow \text{sp}^3$, tetrahedral, paramagnetic 1
 (ii) $[\text{NiCN}_4]^{2-} \rightarrow \text{dsp}^2$, square planar, diamagnetic 1
 (iii) $[\text{CrF}_6]^{3-} \rightarrow \text{sp}^3\text{d}^2$, octahedral, paramagnetic 1

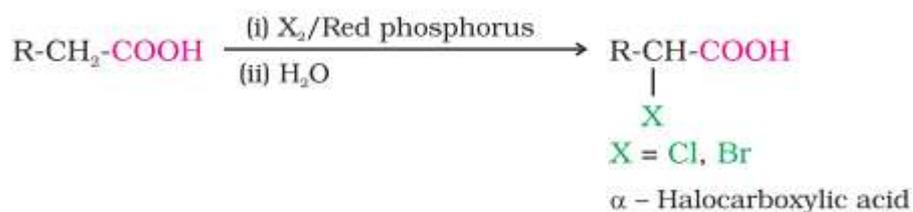
18. (a) (i) In haloarenes, there is double bond character between the carbon and hydrogen due to resonance effect which makes them less reactive.

(ii) In benzene, carbon being sp² hybridized is smaller than the sp³ hybridized carbon in haloalkanes. So, C-Cl bond in aryl halides is shorter and stronger.

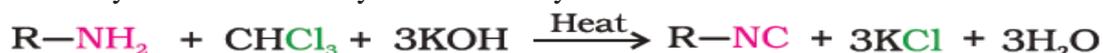
(b) Grignard reagent reacts with water to form alkanes, therefore they are prepared under anhydrous conditions.

(c) p-Dichlorobenzene is symmetrical, fits into the crystal lattice more readily and has a higher melting point.

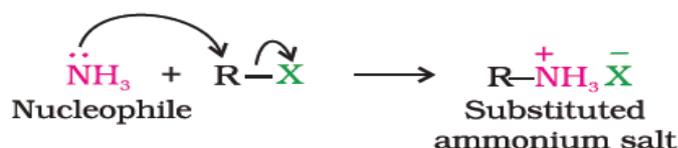
19. 1) Hell-Volhard-Zelinsky reaction: Carboxylic acids having an α-hydrogen are halogenated at the α-position on treatment with chlorine or bromine in the presence of a small amount of red phosphorus to give α-halocarboxylic acids.



2) Aliphatic and aromatic primary amines on heating with chloroform and ethanolic potassium hydroxide form isocyanides or carbylamines



3) This reaction yields a mixture of primary, secondary and tertiary amines and quaternary ammonium salt on reaction of alkyl halide with ammonia.



(1x3=3)

20. a) On boiling during denaturation process water gets adsorbed/absorbed in the denatured proteins.

b) An equimolar aqueous solution of glucose and fructose is called invert sugar

c) Monosaccharides which differ only in the orientation of the —OH group at C-1.e.g, α -glucose and β -glucose.

(1x 3=3)

21. (a)(i) Phenol(C_6H_5OH) and Formaldehyde (HCHO) 1

(ii) Hexamethylenediammine ($H_2N-(CH_2)_6-NH_2$) & Adipic acid($HOOC-(CH_2)_4-COOH$) 1

(b) Teflon $\frac{1}{2}$

Reaction $\frac{1}{2}$

22. (a) Correct definition with examples 1x2=2

(b) 0.1% phenol as antiseptic & 1% used as disinfectant. 1

23. (a) Soap or detergent forms emulsion with water at kraft temperature.

(b) Knowledge is useful when it is put In practice or any other.

24. (a) At a constant temperature, the amount of a given gas that dissolves in a given type and volume of liquid is directly proportional to the partial pressure of that gas is equilibrium with that liquid". 1

Applications: 1. In Scuba diving 2. In soft drinks

(b) formula used 1

Calculation of molar masses $\frac{1}{2}$

Calculation of no. of moles of $CCL_4=0.45$ and $C_6H_6=0.38$ $\frac{1}{2}$

Mole fraction of benzene=0.457

OR

(a) (i) Molarity is T dependent but molality is independent of it. 1

(ii) 0.91 NaCl % (aq) 1

(b) $T_b=0.42K$ 1

Formula used 1

$W_b = 37.7G$ 1

25. (a) $5Fe^{2+} + MnO_4^- + 8H^+ \rightarrow 5Fe^{3+} + Mn^{2+} + 4H_2O$ 1

(b) $Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ = 2Cr^{3+} + 6Fe^{3+} + 7H_2O$ 1

(c) Correct answer with equations 3

OR

(a)(i) Due to unpaired electrons form strong metallic bond.

(ii) Due to d-d transition.

(iii) Due to completely filled d orbitals in their ground state and commonly occurring O.S.

(b) Correct explanation with consequences 3+2

26. (a)(i) reaction 1

(ii) Reaction	1
(b) Reactions with suitable reagents	
1x3=3	
	OR
(a) (i) A = CH ₃ CHO	1
B = C ₆ H ₅ CHO	1
(ii) 2CH ₃ CHO[A] + DiI NaOH → CH ₃ CH(OH)CH ₂ CHO → CH ₃ CH=CHCHO	1
2C ₆ H ₅ CHO[B] + Alkali → C ₆ H ₅ CH ₂ OH + C ₆ H ₅ COO ⁻	1
(iii) Toluene	1

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