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Answer Sheet No. \_\_\_\_\_

Sig. of Candidate. \_\_\_\_\_

Sig. of Invigilator. \_\_\_\_\_

# CHEMISTRY HSSC-II

## SECTION – A (Marks 17)

Time allowed: 25 Minutes

NOTE:- Section-A is compulsory and comprises pages 1- 2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

- (i) Which of the following oxides is most acidic?
- A.  $CO_2$  B.  $Al_2O_3$   
C.  $B_2O_3$  D.  $Cl_2O_7$
- (ii) Chemical formula of plaster of paris is \_\_\_\_\_
- A.  $CaSO_4 \cdot \frac{1}{2}H_2O$  B.  $(CaSO_4)_2 \cdot H_2O$   
C.  $CaSO_4 \cdot 2H_2O$  D. Both A and B
- (iii) Orthoboric acid  $H_3BO_3$  when heated to red hot, gives \_\_\_\_\_
- A.  $HBO_2$  B.  $H_2B_4O_7$   
C.  $B_2O_3$  D.  $H_6B_4O_9$
- (iv) Salts of  $HClO_4$  are known as \_\_\_\_\_
- A. Hypochlorite B. Perchlorate  
C. Chlorite D. Chlorate
- (v) Oxidation state of 'Co' in  $[Co(NH_3)_4Cl_2]Cl$  is \_\_\_\_\_
- A. +3 B. +1  
C. +2 D. -2
- (vi) Increasing order of electronegativity is \_\_\_\_\_
- A.  $Cl < S < P$  B.  $S < Cl < P$   
C.  $P < S < Cl$  D.  $S < P < Cl$
- (vii) When  $CO_2$  is bubbled through an aqueous suspension of  $CaCO_3$ , the product formed is \_\_\_\_\_
- A.  $Ca(OH)_2$  B.  $Ca(HCO_3)_2$   
C.  $H_2CO_3$  D.  $H_2O$
- (viii) Which of the following pairs of substances is Isomers?
- A. Ethyl benzene and 3, 3-Dimethyl pentane  
B. Cyclopentanol and 2 – Pentanone  
C. 2 – Pentanol and 3 – Methyl butanone  
D. Propyl ethanoate and Methyl propanoate
- (ix) Chlorobenzene reacts with 'Mg' in dry ether to give a compound 'X', which further reacts with ethanol to give \_\_\_\_\_
- A. Benzene B. Phenol  
C. Ethyl benzene D. Phenyl ether

- (x) When ethyl iodide reacts with sodium methoxide, it gives \_\_\_\_\_  
A. Methyl ethyl ether                      B. Diethyl ether  
C. Ethanol                                      D. Sodium ethoxide
- (xi) Acetone undergoes reduction with zinc amalgam in HCl to form propane. This is known as \_\_\_\_\_  
A. Clemmensen reduction                      B. Wolf Kishner reduction  
C. Aldol condensation                      D. Hydrogenation
- (xii) Which of the following is an addition polymer?  
A. Polystyrene                                      B. Polyester  
C. Epoxyresins                                      D. Bakelite
- (xiii) Which of the following is **NOT** present in RNA?  
A. Uracil    B. Phosphate  
C. Thymine    D. Ribose
- (xiv) Which of the following primary alcohols will give Iodoform test?  
A. Ethanol    B. Methanol  
C. 1 – Propanol                                      D. 2 – Propanol
- (xv) Which of the following contains oxygen as hetero atom?  
A. Furan    B. Pyrrole  
C. Thiophene    D. Pyridine
- (xvi) Kolbe's electrolysis of sodium n-butyrate ( $\text{CH}_3\text{CH}_2\text{CH}_2\text{COONa}$ ) gives \_\_\_\_\_  
A.  $\text{C}_8\text{H}_{16}$     B.  $\text{C}_6\text{H}_{14}$   
C.  $\text{C}_8\text{H}_{18}$     D.  $\text{C}_6\text{H}_{12}$
- (xvii) Acetic acid undergoes reduction with  $\text{LiAlH}_4$  to give \_\_\_\_\_  
A. Ethanol    B. Ethane  
C. Ethanal    D. Ethyne

For Examiner's use only:

Total Marks:

17

Marks Obtained:

— 2HA 1209 (L) —



# CHEMISTRY HSSC-II

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

NOTE:- Sections B and C comprise pages 1 – 2. Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

## SECTION – B (Marks 42)

Q. 2 Attempt any FOURTEEN parts. The answer to each part should not exceed 5 to 6 lines. (14 x 3 = 42)

- |        |    |   |         |
|--------|----|---|---------|
| (i)    | a. | What are Complexes?   | 01      |
|        | b. | Write the systematic name of the complex $K_3[Fe(CN)_6]$ .  | 01      |
|        | c. | Why $Fe^{+3}$ ions do not exist in solution?  | 01      |
| (ii)   | a. | Give the electronic structure of nitrous acid.  | 01      |
|        | b. | Nitrous acid decolorizes bromine water. Explain this behaviour with the help of chemical equation.                            | 01      |
|        | c. | Write a balanced chemical equation to show, how nitrous acid oxidizes $HCl$ .   | 01      |
| (iii)  |    | Give reasons:   |         |
|        | a. | $LiCl$ is covalent but $NaCl$ is ionic.   | 1.5     |
|        | b. | Phosphorus forms both $PCl_3$ and $PCl_5$ but nitrogen forms only $NCl_3$   | 1.5     |
| (iv)   |    | What is the action of heat on:  |         |
|        | a. | $LiNO_3$  |         |
|        | b. | $NaNO_3$  |         |
|        | c. | $LiOH$  | 1+1+1=3 |
| (v)    | a. | How is borax prepared from colemanite?  | 1.5     |
|        | b. | Give the chemistry of Borax Bead test.  | 1.5     |
| (vi)   |    | Oxides of relatively less electropositive metals are Amphoteric in nature.  |         |
|        | a. | $ZnO$ is amphoteric. Justify this statement.  | 02      |
|        | b. | Arrange the following oxides of Manganese in order of increasing acidic character:<br>$Mn_2O_3$ , $MnO$ , $Mn_2O_7$ , $MnO_2$ | 01      |
| (vii)  | a. | Write down the names and formulae of two oxyacids of chlorine having +3 and +7 oxidation states.                              | 02      |
|        | b. | Why are the oxyacids of chlorine stronger than the corresponding oxyacids of bromine and iodine?                              | 01      |
| (viii) |    | Give complete and balanced chemical equations for the reaction between:   |         |
|        | a. | Zinc with conc. $HNO_3$   | 01      |
|        | b. | Copper with hot conc. $H_2SO_4$   | 01      |
|        | c. | $NaBr$ with conc. $H_2SO_4$   | 01      |
| (ix)   | a. | Write down the names and formulae of two non-silicate ores of aluminium.  | 01      |
|        | b. | Explain why Aluminium is used in flash light photography?   | 01      |
|        | c. | Explain why Aluminium is often used to remove air bubbles from molten metals.   | 01      |
| (x)    | a. | What is the effect of branching on the boiling points of Alkanes?   | 01      |
|        | b. | What are the three different alkenes that yield 2 – methyl butane, when they are hydrogenated in the presence of a catalyst?  | 02      |
| (xi)   |    | Explain why:  |         |
|        | a. | Hydroxyl group ( $-OH$ ) in phenol is ortho-para directing.   | 1.5     |
|        | b. | Phenol undergoes Nitration faster than nitrobenzene.  | 1.5     |



- (xii) What happens when:
- 2 – Methyl 2 – butene is ozonolysed, followed by  $Zn / H_2O$  treatment. 1.5
  - Acetaldehyde is treated with  $NaCN / HCl$  and the product is followed by acid hydrolysis. 1.5
- (xiii) A secondary Alcohol 'A'  $C_3H_8O$  reacted with thionyl chloride to give compound 'B'  $C_3H_7Cl$ . Compound 'B' reacted with Benzene in the presence of  $AlCl_3$  to give compound 'C'  $C_9H_{12}$ . Identify 'A', 'B' and 'C'. 03
- (xiv) a. Write the formula of **2,4 – Dinitrophenyl hydrazine** and **Semicarbazide** 01  
 b. Give the mechanism of the reaction between formaldehyde and hydrazine. 02
- (xv) Starch is a mixture of Amylose and amylopectin.  
 a. Point out the structural difference between amylose and amylopectin. 02  
 b. How they can be differentiated chemically? 01
- (xvi) Write the structural formula of the following:  
 a. Acrylonitrile    b. Acetophenone    c. Adipic acid 03
- (xvii) How will you convert:  
 a. Acetic acid to acetaldehyde    b. Ethyl bromide to propionic acid 1.5+1.5
- (xviii) Predict the products:  
 a.  $(CH_3)_3C-OH \xrightarrow[\text{Heat}]{\text{Conc. } H_2SO_4} ?$  1.5  
 b.  $C_6H_5-CH_2CH_3 \xrightarrow[O]{KMnO_4} ?$  1.5
- (xix) Differentiate between the following pairs of compounds? Also give your observations with the help of only one valid chemical test in each case:  
 a. 1 – Butyne and 2 – Butyne    b. Methanol and Ethanol 1+1  
 c. Aldehydes and Ketones 01

#### SECTION – C (Marks 26)

**Note:- Attempt any TWO questions. All questions carry equal marks. (2 x 13 = 26)**

- Q. 3** The reactions in which halogen atom of an alkyl halide is replaced by a Nucleophile are called  $S_N$  reactions.
- Compare in tabular form, the  $S_N1$  and  $S_N2$  reactions. 06
  - What is Orbital hybridization? Explain  $sp^2$  hybridization in ethene. 04
  - What is Cannizzaro's reaction? Write its mechanism. 03
- Q. 4**
- How is Sodium prepared electrolytically by Down's Cell? 06
  - Slow and continuous eating away of a metal by atmospheric reagents is called corrosion.  
 (i) How does the electrochemical theory explain the phenomenon of corrosion? 04  
 (ii) Why is galvanizing superior to Tin Plating? 03
- Q. 5**
- What are Lipids? Describe the properties of lipids under the following heads:  
 (i) Saponification  
 (ii) Hardening of oils 04
  - Quality of water is determined in terms of certain factors. Explain:  
 (i) Bio – Chemical Oxygen Demand (BOD)  
 (ii) Chemical Oxygen Demand (COD) 04
  - Describe the different steps involved in the manufacture of Urea. 05

**CHEMISTRY HSSC-II**  
**SECTION – A (Marks 17)**

Time allowed: 25 Minutes

NOTE:- Section-A is compulsory and comprises pages 1-2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

- (i) Which metallic oxide has the most basic character?
- A.  $MgO$  B.  $BeO$   
C.  $SrO$  D.  $BaO$
- (ii) The anhydride of perchloric acid is \_\_\_\_\_
- A.  $ClO_2$  B.  $Cl_2O_3$   
C.  $ClO_3$  D.  $Cl_2O_7$
- (iii) Which of the following minerals does **NOT** contain aluminium?
- A. Cryolite B. Mica  
C. Fluorspar D. Feldspar
- (iv) The shape of  $[Cu(NH_3)_4]^{+2}$  is square planar.  $Cu^{+2}$  in this complex is \_\_\_\_\_
- A.  $sp^3$  hybridized B.  $sp^3d^2$  hybridized  
C.  $dsp^2$  hybridized D.  $sp^3d$  hybridized
- (v) Which does **NOT** form oxide on heating?
- A.  $Li_2CO_3$  B.  $Na_2CO_3$   
C.  $CaCO_3$  D.  $MgCO_3$
- (vi) Which order is correct for the boiling points of halogen acids?
- A.  $HF > HI > HBr > HCl$  B.  $HF > HCl > HBr > HI$   
C.  $HI > HBr > HCl > HF$  D.  $HF > HBr > HCl > HI$
- (vii) Chemical composition of Colemanite is \_\_\_\_\_
- A.  $Ca_2B_6O_{11} \cdot 5H_2O$  B.  $Ca_2B_4O_7 \cdot 5H_2O$   
C.  $Na_2B_4O_7 \cdot 10H_2O$  D. None of these
- (viii) Which of the following nitrates gives dinitrogen oxide ( $N_2O$ ) on heating?
- A.  $Ca(NO_3)_2$  B.  $NaNO_3$   
C.  $NH_4NO_3$  D.  $Mg(NO_3)_2$
- (ix) Propyne reacts with aqueous  $H_2SO_4$  in the presence of  $HgSO_4$  to form \_\_\_\_\_
- A. Acetone B. 1-Propanol  
C. 2-Propanol D. Acetaldehyde



- (x) Which of the following IUPAC name is correct?
- |                             |                             |
|-----------------------------|-----------------------------|
| A. 3-Ethyl-2-methyl pentane | B. 2-Methyl-3-ethyl pentane |
| C. 2-Ethyl-3-methyl pentane | D. 3-Methyl-2-ethyl pentane |
- (xi) A hydrocarbon  $C_6H_{12}$  on ozonolysis gives only one product, which does **NOT** give silver mirror test with Tollen's reagent, the hydrocarbon is \_\_\_\_\_
- |                          |                          |
|--------------------------|--------------------------|
| A. 2,3-dimethyl-2-butene | B. 2-hexene              |
| C. 2-methyl-2-pentene    | D. 2,2-dimethyl 2-butene |
- (xii) Which is a suitable reagent to convert  $C_2H_5Br$  to  $C_2H_6$  ?
- |               |                  |
|---------------|------------------|
| A. Na/alcohol | B. Alcoholic KOH |
| C. Zn+HCl     | D. NaCN+HCl      |
- (xiii) Iso-propyl alcohol reacts with acidified potassium dichromate to give \_\_\_\_\_
- |                   |                |
|-------------------|----------------|
| A. Acetaldehyde   | B. Acetic acid |
| C. Propionic acid | D. Acetone     |
- (xiv) Heating a mixture of calcium formate and calcium acetate produces \_\_\_\_\_
- |                 |                 |
|-----------------|-----------------|
| A. Acetone      | B. Acetic acid  |
| C. Formaldehyde | D. Acetaldehyde |
- (xv) Ethanoic acid can be obtained by the acid hydrolysis of \_\_\_\_\_
- |                   |                  |
|-------------------|------------------|
| A. Methyl cyanide | B. Ethyl cyanide |
| C. Ethanol        | D. Methanol      |
- (xvi) Which of the following is fluorocarbon plastic?
- |           |          |
|-----------|----------|
| A. Nylon  | B. Furan |
| C. Teflon | D. Freon |
- (xvii) In the following sequence of reactions  $CH_3CH_2CH_2Br \xrightarrow{alc. KOH} A \xrightarrow{HBr} B \xrightarrow{aq. KOH} C$ , the product 'C' is \_\_\_\_\_
- |               |               |
|---------------|---------------|
| A. Propene    | B. 2-Propanol |
| C. 1-propanol | D. Propyne    |

For Examiner's use only:

Total Marks:

17

Marks Obtained:

— 2HA 1209 (ON) —



# CHEMISTRY HSSC-II

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

NOTE:- Sections B and C comprise pages 1-2. Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

## SECTION – B (Marks 42)

Q. 2 Attempt any FOURTEEN parts. The answer to each part should not exceed 5 to 6 lines. (14 x 3 = 42)

- (i) Borax is the salt of tetraboric acid.
  - a. What is the formula of borax? 01
  - b. Why is the aqueous solution of borax alkaline? 01
  - c. How is borax used as a water softening agent? 01
- (ii) One of the features of transition metals is the formation of coloured compounds.
  - a. Explain why most of transition metal compounds are coloured. 02
  - b. Why are  $Sc^{+3}$  and  $Zn^{+2}$  compounds colourless? 01
- (iii) Give reasons for the following:
  - a.  $PbCl_2$  is ionic while  $PbCl_4$  is covalent. 1.5
  - b. Hydration energies are in the order  $Al^{3+} > Mg^{2+} > Na^+$ . 1.5
- (iv) Sulphuric acid is an important laboratory reagent.
  - a. What happens when sugar crystals are put in conc.  $H_2SO_4$ ? 1.5
  - b. It is used to dry certain gases but cannot be used to dry  $NH_3$  and  $H_2S$  gas. Explain. 1.5
- (v) Write balanced chemical equations for the following when:
  - a. NaH is treated with water. 01
  - b.  $LiNO_3$  is heated. 01
  - c. Beryllium is treated with NaOH. 01
- (vi)
  - a. What are disproportionation reactions? 01
  - b. The reaction of  $Cl_2$  with hot and cold NaOH is an example of disproportionation reaction. Explain your answer with the help of the balanced chemical equations. 02
- (vii) Potassium Dichromate is an oxidizing agent.
  - a. Draw the structure of dichromate ion. 01
  - b. How is chromate ion converted into dichromate ion? 01
  - c. Write a balanced chemical equation for its oxidizing action on  $H_2S$ . 01
- (viii)
  - a. How is the ozone layer being depleted by CFCs (Chlorofluorocarbons)? 02
  - b. What is the importance of ozone layer? 01
- (ix) Halogens belong to group VIIA of the periodic table.
  - a. Explain why they are strong oxidizing agent. 01
  - b. Arrange  $F_2$ ,  $Br_2$ ,  $I_2$  and  $Cl_2$  in order of increasing oxidizing power. 01
  - c. Is the following reaction feasible or not. Explain your answer.  $Cl_2 + 2Br^- \rightarrow Br_2 + 2Cl^-$  01
- (x) Identify each lettered product:
  - a.  $CH_3OH \xrightarrow{H^+} (A) \xrightarrow[\text{alcohol}]{Mg} (B) \xrightarrow[(ii) H_2O/H^+]{(i) CO_2} (C)$  1.5
  - b.  $CH_3COOH \xrightarrow{Ca(OH)_2} (A) \xrightarrow{\text{heat}} (B) \xrightarrow{N_2H_4} (C)$  1.5
- (xi) Write the structural formula of the following:
  - a. Maleic anhydride
  - b. Crotonaldehyde
  - c. Phthalic acid

1+1+1=3



(xii)	Nylon is a synthetic condensation polymer	
a.	Define condensation polymerization.	01
b.	Write the structural formula of the monomeric units of Nylon 66.	01
c.	In what way does the structure of Nylon resemble protein?	01
(xiii)	How will you convert:	
a.	Formaldehyde to Acetaldehyde.	1.5
b.	n-propyl alcohol to Iso-propyl alcohol	1.5
(xiv)	A hydrocarbon 'A' reacts with hydrogen iodide to form compound 'B' which reacts with aqueous KOH to give compound 'C'. Oxidation of 'C' gives acetone. What are the structural formulas of 'A', 'B' and 'C'. Give equations for all reactions.	03
(xv)	What happens when:	
a.	Ethene is halogenated in an aqueous solution.	01
b.	Acetic acid is heated with $P_2O_5$ .	01
c.	Sodium benzoate is heated with sodalime.	01
(xvi)	Amino acids are the building blocks of protein and exist as Zwitterion.	
a.	What is Zwitter ion? Give an example.	01
b.	How are amino acids prepared by strecker's method?	01
c.	How do Amino acids react with nitrous acid?	01
(xvii)	Benzene readily gives electrophilic substitution reactions.	
a.	What is Friedel Crafts Acylation?	01
b.	Write the mechanism of the formation of benzophenone from benzene.	02
(xviii)	Both alkenes and alkynes are unsaturated hydrocarbons.	
a.	How will you differentiate between ethene and ethyne? Give your observations with the help of a valid chemical test.	01
b.	Explain why ethene is more reactive than ethyne.	01
c.	How does ethyne react with ammonia?	01
(xix)	a. What is functional group isomerism?	01
b.	Write the structural formulas of the functional group isomers having the molecular formula $C_3H_6O$ .	01
c.	Name these isomers by IUPAC system.	01

#### SECTION – C (Marks 26)

**Note:- Attempt any TWO questions. All questions carry equal marks. (2 x 13 = 26)**

- Q. 3** Iron is most widely used metal particularly alloyed with other elements in steel.
- What are the chief ores of Iron? 02
  - What is wrought Iron? How can it be manufactured from cast Iron? 05
  - Why does damaged tin plated Iron get rusted quickly? 02
  - Explain the following terms by giving examples: 04
    - Chelates
    - Substitutional Alloys
- Q. 4** Cyclic structure of benzene was proposed by Kekule.
- What were the arguments which support Kekule structure? Why was his structure ruled out? 04
  - Explain the concept which correctly describe the structure of benzene. 05
  - Explain why benzene is more reactive than ethane but less reactive than ethene. Support your answer by giving examples. 04
- Q. 5** Cement is an important building material.
- Define Cement. Name the raw materials required for its preparation. 03
  - Explain stepwise the manufacture of cement by wet process. 06
  - What is meant by the term "setting of cement"? Describe various reactions taking place during setting process. 04

— 2HA 1209 (ON) —