CHEMISTRY 2014

Time: 20 Minutes Max. Marks: 17

SECTION "A" (MULTIPLE CHOICE QUESTIONS)

1. Choose the correct answer for each from the given options:

(i) The ratio of electron, proton and neutron in protium is:
* (1 : 1 : 0) * (1 : 1 : 1) * (1 : 2 : 1) * (1 : 1 : 2)

(ii) EDTA is:
* Bidentate ligand * Monodentate ligand
* Chelate * Multidentate ligand

(iii) Another name for methane is:
* Maustard gas * Oil gas * Coal gas * Marsh gas

(iv) An example of electron deficient hydrides is:
* BH_3 * $NaBH_4$ * NaH * CH_4

(v) Chemical name for Fruit sugar is:
* Sucrose * Glucose * Lactose * Fructose

(vi) The bond angle and bond distance between the atoms in rhombic sulphur are:
* $2.12\overset{o}{A}\&105^o$ * $2.12\overset{o}{A}\&107^o$ * $2.3\overset{o}{A}\&105^o$ * $2.22\overset{o}{A}\&108^o$

(vii) This is animal starch:
* Glycogen * Amylose * Cellulose * Amino acid

(viii) Density of 98% HNO_3 is:
* 1.51 g/l * 1.4 g/l * 1.83 g/l * 1.42 g/l

(ix) The chemical formula $Al_2O_3.3H_2O$ stands for:
* Diaspore * Corundum * Bauxite * Gibbisite

(x) This imparts red colour to glass:
* Cr_2O_3 * CuO * CoO * ZnO

(xi) The formula of Caproic acid is:
* $CH_3.(CH_2)_2.COOH$ * $CH_3.(CH_2)_3.COOH$
* $CH_3.CH_2.COOH$ * $CH_3.(CH_2)_4.COOH$

(xii) The number of carbon atoms in a Monosaccharide is:
* 3 – 10 * 2 – 8 * 3 – 9 * 4 – 9

(xiii) Fertlizer maintains the range of pH of soil at:
* 7.0 – 8.0 * 4.0 – 6.0 * 1.2 – 4.2 * 12.0 – 14.0

(xiv) The first seven groups of the periodic table are divided sub-groups 'A' consisting of:
* Transition elements * Representative elements
* Metallic elements * Complex elements

(xv) Interstitial hydrides are also named as:
* Metallic hydrides * Covalent hydrides
* Borderline hydrides * Ionic hydrides

(xvi) Saponification results in the formation of:
* Glass * Polymer * Fertilizer * Soap

(xvii) The boiling point range 40o 200oC is for this fraction of petroleum:
* Wax * Gasoline * Heavy oil * Jet fuel

CHEMISTRY 2014

Time: 2 Hours 40 Minutes Marks: 68

SECTION 'B' (SHORT-ANSWER QUESTIONS)(40)

NOTE: Attempt any Five questions from Inorganic Chemistry and Five questions from Organic Chemistry.

INORGANIC CHEMISTRY

Q.2(i) What are the demerits of Mendeleev's periodic classification? How was it modified?

(ii) Give scientific reasons for any four:
- NH_3 and H_2O act as ligands but NH_4^+ and H_3O^+ do not.
- Graphite conducts electricity, whereas diamond does not.
- B_2O_3 is acidic while Al_2O_3 is amphoteric.
- Alkaline earth metal ions are more strongly hydrated than alkali metal ions.
- Most of the transition elements and their compounds are paramagnetic.

(iii) Describe the manufacture of Chlorine gas by Castner-Kellner call.

(iv) Give equations for the following reactions:
- Chrome yellow with Caustic soda.
- Electrolytic oxidation of Postassium manganate by water.
- Potassium dichromate with conc. H_2SO_4.
- Chromium oxide with KOH and Bromine water.

(v)(a) Write I.U.P.A.C. names of the following:
♦ $\left[Fe(NO_2)_6\right]^{-3}$ ♦ $\left[Cr(en)_2Cl_2\right]Cl$

(b) How is Bauxite ore purified by Baeyer's OR Serpeck's process?

(vi)(a) Write the electronic configuration of Zn (Z = 30), group, period and block.

(b) What is Water gas? Giver one method of its preparation.

(vii)(a) How does Crystal Field Theory explain the colour of complex ions?

(b) Write the formulae for the following:
♦ Alunite ♦ Hypo ♦ Magnesite ♦ Fluorspar

(viii)(a) Draw the structure of HNO_3 in vapour and sold phases.

(b) What is Aqua Regia? How does Gold dissolve in it? Give the reaction.

ORGANIC CHEMISTRY

(ix)(a) Draw and explain the orbital structure of Ethyne.

(b) What is Rancidification? Mention its causes.

(x)(a) Define the following:
♦ Homologous series ♦ Cracking
♦ Refining of petroleum ♦ Carbohydrate

(xi)(a) Give the mechanism of chlorination of Methane in the presence of sunlight.

(b) How is the purity of oil and fat determined?

(xii) Give equations for the following reactions:
♦ Methanol with steam ♦ Glucose with Tollen's Reagent
♦ Acetyl chloride with Sodium ethanoate
♦ Ethanol with Grignard Reagent

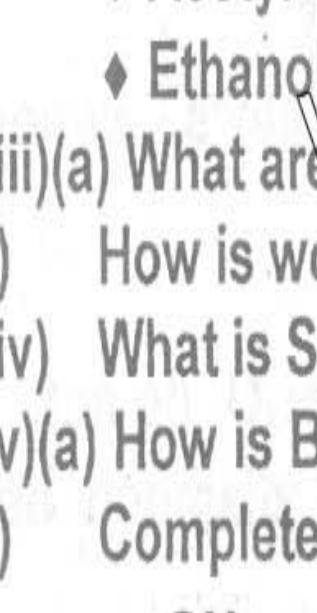
(xiii)(a) What are Monohydric alcohols? How are they classifies?

(b) How is wood spirit manufactured from Water gas?

(xiv) What is Synthetic fiber? Explain Nylon and Polyester.

(xv)(a) How is Benzene prepared commercially from petroleum?

(b) Complete the following reactions:

♦  $+H_2 \xrightarrow{catalyst}$ ♦ $H-\overset{\overset{O}{||}}{C}-H \xrightarrow{Polymerizatiun}$

(xvi) Differentiate between the following:
♦ Saturated and Unsaturated hydrocarbon
♦ Reducing and Non-reducing sugar

SECTION'C' (DETAILED- ANSWER QUESTIONS)

NOTE: Attempt Two questions – One question from Inorganic Chemistry and the other from Organic Chemistry. (28)

INORGANIC CHEMISTRY

Q.3(a) How is Soda ash manufactured by Ammonia Solvay process?

(b) Describe the extraction of pure Copper from roasted pyrite ore.

(c) Complete the following equations:
- $P+HNO_3 \longrightarrow$ • $Zn+HNO_3 \xrightarrow{v.\,dilute}$
- $H_2S+H_2SO_4 \longrightarrow$ • $CaOCl_2+CO_2+H_2O \longrightarrow$
- $AgBr+Na_2S_2O_3 \longrightarrow$

Q.4(a) Explain why Hydrogen is misfit in group IA and VIIA of the periodic table.

(b) Describe the manufacture of Sulphuric acid by Contact process. Draw the flow diagram.

(c) Write notes on any two of the following:
• Borax • Atomic hydrogen • Blue vitriol

ORGANIC CHEMISTRY

Q.5(a) Describe Kekule structure of Benzene. Write the objection against it. How was this objection removed by Kekule?

(b) What are Elimination Reactions? Write Bimolecular Elimination Reaction with its mechanism.

(c) Give equations for the following reactions.
- Phenol with dilute HNO_3
- Ethanal with Sodium and Ethanol
- Toluene with $KMnO_4$.
- 2-Propanone with Methyl magnesium chloride.
- Acetylene with cold $KMnO_4$.

Q.6(a) What is fermentation? How is Ethyl alcohol manufactured by the fermentation of:
• Starch • Molasses

(b) Why does Benzene give Electrophilic Substitution reactions? Explain the mechanism of Friedel-Craft's Acylation.

OR Write notes on any two of the following:
• Glass • Detergent • Amino acids

(c) Write I.U.P.A.C. names of the following:

(i) $CH_2-\underset{\underset{CH_3}{|}}{C}-CH\equiv CH$

(ii) $CH_3-\overset{\overset{O}{||}}{C}-O-C(CH_3)_3$

(iii) $CH_3-CH=CH-\underset{\underset{OH}{|}}{CH}-\underset{\underset{CH_3}{|}}{CH}-CH_3$

(iv) $CH_3-CH_2-O-C(CH_3)_3$

(v)