Vithalbhai Patel & Rajratna P. T. Patel Science College
Vallabh Vidyanagar

B. Sc. (Semester- I)

Subject : GENERAL CHEMISTRY (US01CCHE01)

Day : Tuesday **Internal Test – October, 2013** **Marks : 30**

Date : 01-10-2013 **Time : 11.00 am to 12.00 noon**

Note : (i) All questions are to be attempted. (ii) Figures to the right indicate marks.

[**Given :** Atomic weight of C = 12, O = 16, H = 1, N = 14, S = 32, Ba = 138, Cl = 35.5 gm/mole].

Q.1 Choose the correct option for the following : [6]

(i) When a common ion is added to a saturated solution of a salt, solubility of the salt is.....
(a) Increase (b) decrease (c) remains constant (d) none of these.

(ii) Which of the following is Arrhenius base ?
(a) NH_3 (b) NaOH (c) NH_4^+ (d) NH_2^-.

(iii) In Kjeldahal's method, the organic compound is digested with.....
(a) conc. H_2SO_4 (b) conc. HNO_3 (c) conc. H_3PO_4 (d) conc. HCl

(iv) How many isomers are possible for butane ?
(a) 5 (b) 3 (c) 4 (d) 2

(v) Valency of "NO" ligand is.....
(a) cationic (b) anionic (c) neutral (d) none of these.

(vi) Which chelating agent is used for the removal of harmful radioactive metals from our body ?
(a) Glycinato (b) edta (c) en (d) dmg

Q.2 Answer the following (Attempt any three) : [6]

(i) State the conjugated bases of (i) CH_3COOH (ii) NH_3.

(ii) Complete and rewrite the following reactions and label as Lewis acids and Lewis bases in each one.
(i) $BF_3 + F^- =$ .....
(ii) $BF_3 + NH_3 =$ .....

(iii) Calculate the percentage composition of each elements present in an organic compound having molecular formula C_3H_7Cl.

(iv) Discuss the method for the quantitative analysis of carbon and hydrogen in an organic compound.

(v) Distinguish between : Double salt and co-ordination compounds.

(vi) Give the name and structural formula for the following abbreviation :
(i) $(ox)^{-2}$ (ii) $(acac)^-$

Q.3 [6]

[A] Explain : All Lewis bases are Lowery- Bronsted bases, but all Lewis acids are not Lowery- Bronsted acids.

[B] When silver ion is added to a solution that contains Cl^- and I^- both at 0.01 M concentrations, (i) which salt will precipitates first, AgCl or AgI ? (ii) what is the values of $[Ag^+]$ when the first salts starts to precipitates ? (iii) what is the concentration of the anion of the first precipitates when the second salt just

starts to precipitates ? [Given: $K_{sp(AgCl)} = 2.8 \times 10^{-10}$ and $K_{sp(AgI)} = 8.5 \times 10^{-17}$]

OR

Q.3 [6]

[A] Discuss Arrhenius concept of acids and bases. What are the limitation of this concept ?

[B] Define the terms "solubility" and "solubility product". Also calculate the solubility of AgCl in 0.1 M $AgNO_3$ solution. The solubility product of AgCl is 2.8×10^{-10}.

Q.4 [6]

[A] Explain : Boiling point of n-pentane and iso-pentane are 36 and 28°C respectively.

[B] A Kjeldahal's nitrogen analysis of a 3.80 mg sample of ethanolamine required 5.70 mL of 0.011 M hydrochloric acid for titration of the ammonia produced. Calculate the percentage of nitrogen in the ethanolamine.

OR

Q.4 [6]

[A] The names given below are objectionable. Rewrite their correct IUPAC name and structure :

(i) 1,1,1–trimethylhexane (ii) 2,2–diethylbutane (iii) 2–propyl–1–propene.

[B] Discuss Carius method used for the quantitative analysis of sulfur. A Carius sulfur analysis of a 4.80 mg of thiophene sample gave 6.40 mg of $BaSO_4$. Calculate the percentage of sulfur in the thiophene.

Q.5 [6]

[A] What are ligands ? Discuss the broad classification of ligands.

[B] Write IUPAC name for the following :

(i) $[Co^{III}(NH_3)_6]\,[Cr^{III}(NH_3)_6]$ (ii) $[Ag^{I}Cl_2]^-$ (iii) $[CoCl(H_2O)_2(NH_3)_3]^{+2}$

OR

Q.5 [6]

[A] What is chelate compounds and chelate effect ? Discuss the uses of chelates.

[B] In the co-ordination compound $[CrCl(H_2O)(en)_2]Cl_2$

(i) the oxidation state of chromium ion is ----------

(ii) the co-ordination number of chromium ion is ----------

(iii) the dentate character of different ligands are ----------

(iv) Ionic charge on complex cation is ----------

(v) the number of non-coordinated chlorine ion is ----------

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