[89] No. of printed pages: 3

**SARDAR PATEL UNIVERSITY**
**B.Sc. (I Semester) EXAMINATION**
**Monday, 3rd December 2012**
**2.30 pm to 4.30 pm**
**US01CCHE01 - General Chemistry**

**Total Marks : 70**

**Instructions:**
(1) All questions are to be attempted.
(2) Figures to the right indicate marks.
(3) Given : Atomic weight of C=12.01, H=1.008, N=14.01, O=16.0 gm/mole.

Q.1 Choose and re-write the correct answer from given options for each of the following. [10]

1. The quantity taken for sub-micro analysis is
   (a) $10^{-4}$ gm or less (b) $10^{-3}$ gm to $10^{-2}$ gm
   (c) $10^{-2}$ gm to $10^{-1}$ gm (d) $10^{-3}$ gm to $10^{-4}$ gm
2. The methods based on measurement of potential of an electrode in equilibrium with an ion to be studied is known as
   (a) Voltametry (b) Coulometry
   (c) Potentiometry (d) Chromatography
3. The conjugate base of $H_3O^+$ is _____
   (a) $H_2O$ (b) $OH^{\ominus}$
   (c) $HCO_3^-$ (d) None of these
4. According to Lewis concept, acid is ;
   (a) Electron donor (B) Electron acceptor
   (c) Proton donor (d) Proton acceptor
5. _____ is a sparingly soluble salt.
   (a) KCl (b) AgCl
   (c) NaCl (d) All of these
6. During combustion of an organic compound CuO is used as
   (a) Reducing agent (b) Catalyst
   (c) Oxidizing agent (d) None of these
7. In a homologous series, each member differ from the next member by a constant _____ unit.
   (a) $-CH_3$ (b) $-CH_2-$
   (c) $-C_2H_2$ (d) -CH-
8. The estimation of Halogen is done by
   (a) Carius method (b) Dumas method
   (c) Kjeldahl's method (d) None of these
9. The abbreviation "en" is used for
   (a) Ethylene diamine tetra acetate (b) Ethylene diamine
   (c) Dimethyl glyoxime (d) Diethylene triamine
10. The ligands which can be co-ordinated to the central metal ion through either of the two donor atoms are called _____
    (a) Bi-dentate Ligand (b) Bridging Ligand
    (c) Polydentate Ligand (d) Ambidentate Ligand

Q.2 Answer **ANY TEN** of the following. [20]

1. Define : (i) Accuracy (ii) Precision
2. The following values were obtained for the determination of cadmium in a sample of dust : 4.3, 4.1, 4.0, 3.2 $\mu g\ g^{-1}$. Should the value 3.2 be rejected ? Qcritical is 0.831.
3. Give the stages of chemical analysis.
4. The solubility product of AgCl is $2.8 \times 10^{-10}$. Calculate solubility of AgCl in pure water.
5. Define : (i) Solubility (ii) Common ion effect.
6. All Lewis bases are Lowry-Bronsted bases but all Lewis acids are not Lowry-Bronsted acid. Explain
7. What is the percentage composition of each elements present in an organic compound having molecular formula $C_2H_6O$.
8. Explain: Lassaigne's test for the detection of elements in Organic compound.
9. Define : (i) Empirical formula (ii) Molecular formula
10. Give the structural formula of : (i) Mohr's salt (ii) Potash alum
11. Define the terms (i) Co-ordination number (ii) Co-ordination sphere
12. "Every multidentate ligand is not a chelating Ligand". Explain.

Q.3 (a) Define error. Give the classification of error. [03]

(b) Discuss classification of the methods of analysis on the basis of "nature of information" and "size of the sample". [03]

(c) Analysis of a sample of iron ore gave the following percentage values for the iron content : 7.08, 7.21, 7.12, 7.09, 7.16, 7.14, 7.07, 7.14, 7.18 and 7.11 calculate the mean, standard deviation and coefficient of variation for the values. [04]

**OR**

Q.3 (a) Give the classification of quantitative analysis. [03]

(b) Explan: "Analytical chemistry is an interdisciplinary branch." [03]

(c) Discuss any four methods for minimization of systematic errors. [04]

Q.4 (a) Discuss in detail-about self ionization of water and prove that $pH + pOH = pk_w = 14$. [04]

(b) Discuss Arrhenius ionic dissociation theory for acid and base with its limitations. [03]

(c) The solubility of $Ag_2CrO_4$ in pure water is $0.78 \times 10^{-4}$M. Will its solubility in 0.05M $AgNO_3$ be greater **or** less than $0.78 \times 10^{-4}$M ? Why? Will $[Ag^+]$ in the resulting solution be greater, less **or** equal to 0.05M ? Show that the solubility of $Ag_2CrO_4$ in 0.05M $AgNO_3$ is $7.6 \times 10^{-10}$M. [03]

**OR**

Q.4 (a) Write a note on : Selective precipitation. [04]

(b) State and explain Lowry-Bronsted theory of acids and bases. [03]

(c) Calculate the solubility of $CaF_2$ in 0.1M $Ca(NO_3)_2$. [03]
[$K_{sp}$ of $CaF_2 = 1.7 \times 10^{-10}$]

Q.5 (a) The names given below are objectionable. Rewrite the correct IUPAC name and structure. [04]

(i) 3-Methyl-2-butene (ii) 6-Octene

(iii) 1,1,1-Trimethyl pentane (iv) 1-Bromo-2-propene

(b) Explain:Boiling point of n-butane, n-pentane and n-hexane are 0°, 36° and 69°C respectively. [03]

(c) Indigo, an important dyestuff, gave an analysis of 73.3% carbon, 3.8% hydrogen and 10.7% nitrogen. Molecular weight determination gave a value of 262 gm/mole. What is the molecular formula of indigo ? [03]

**OR**

Q.5 (a) Draw the structure of following and write their IUPAC names. [03]

(i) Allyl bromide (ii) Isobutene (iii) Neopentane

(b) Give *E*,*Z*-configuration for the following. If poosible. If not possible then give reason for that. [03]

(i) 2-pentene (ii) 2-Methyl-2-butene (iii) 1-chloropropene

(c) In Dumas nitrogen analysis of a 5.72 mg sample of 1,4-diaminobenzene gave 1.31 ml of nitrogen gas at 20°C and 746 mm pressure. The gas was collected over saturated aqueous KOH solution. Calculate the percentage of nitrogen in the compound. [The vapor pressure of water is 6mm] [04]

Q.6 Define the term Ligand. Discuss classification of ligands on the basis of dentate character with suitable examples. [10]

**OR**

Q.6 Draw the structures of complexes having co-ordination number 2 to 9 and discuss their geometry. [10]

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