SAMPLE QUESTION PAPER

CHEMISTRY (043)

CLASS – XII – (2014-2015)

QUESTION PAPER DESIGN

CLASS XII CBSE

Types of Questions

S.No	Type of Question	Marks for each Question	No. of Questions	Total Marks
1.	Long Answers (LA)	5	03	15
2.	Value based question	4	01	04
3.	Short Answers-II(SA II)	3	12	36
4.	Short Answers-I(SA I)	2	05	10
5.	Very Short Answer (VSA)	1	05	05
	Total		26	70

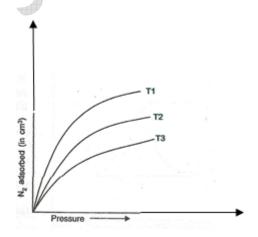| Type of questions	VSA(1)	SA1(2)	SA2(3)	VB(4)	LA(5)	Total(%)
Knowledge	2	1	1	-	-	07 (10%)
Understanding	-	2	4	-	1	21 (30%)
Application	-	2	4	-	1	21 (30%)
HOTS (Higher order thinking skills)	2	-	1	-	1	10(14%)
Evaluation and Multi-disciplinary	1	-	2	1	-	11(16%)

SAMPLE QUESTION PAPER

CHEMISTRY

CLASS – XII (2014 – 2015)

Time Allowed: 3 hr   **Maximum marks: 70**
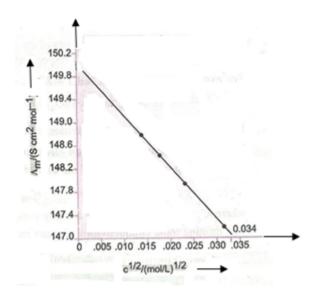
General Instructions:

(a)   *All questions are compulsory.*

(b)   *Q.no. 1 to 5 are very short answer questions and carry 1 mark each.*

(c)   *Q.no. 6 to 10 are short answer questions and carry 2 marks each.*

(d)   *Q.no. 11 to 22 are also short answer questions and carry 3 marks each*

(e)   *Q.no. 23 is a value based question and carry 4 marks.*

(f)   *Q.no. 24 to 26 are long answer questions and carry 5 marks each*

(g)   *Use log tables if necessary, use of calculators is not allowed.*

1.   The following figure shows the variation of adsorption of N_2 on charcoal with pressure at different constant temperatures:

Arrange the temperatures T1, T2 and T3 in the increasing order.

2. Give the formula of a noble gas species which is isostructural with **IBr$_2^-$**.

3. What is the effect of synergic bonding interactions in a metal carbonyl complex?

4. PCl$_5$ acts as an oxidizing agent. Justify.

5. Write the name of the product formed when benzenediazonium chloride solution is treated with potassium iodide.

6. Name the crystal defect which reduces the density of an ionic solid? What type of ionic substances show this defect?

7. The molar conductivity (λ_m) of KCl solutions at different concentrations at 298 K is plotted as shown in the figure given below:

Determine the value of λ_m^0 and A for KCl.

8. Aluminum crystallizes in anfcc structure. Atomic radius of the metal is 125 pm. What is the length of the side of the unit cell of the metal?

9. Draw the structure of the following compounds:

   (i)   H$_2$S$_2$O$_7$

   (ii)   XeOF$_4$

   OR

   Write balanced chemical equations for the following:

   (i)   Reaction of chlorine with hot and concentrated NaOH.

(ii)   Sulphur dioxide is passed through an aqueous solution of Fe (III) salt.

10. 0.5 g of KCl was dissolved in 100 g of water and the solution originally at 20^0C, froze at -0.24^{0}C. Calculate the percentage dissociation of the salt.

(Given :K_f for water = 1.86 K kg /mol, Atomic mass: K = 39 u, Cl= 35.5 u)

11. State briefly the principles involved in the following operations in metallurgy. Give an example.

   (i)   Hydraulic washing.

   (ii)   Zone refining.

12.

   i)   What type of deviation from Raoult's law is observed, when two volatile liquids A and B on mixing produce a warm solution? Explain with the help of a well labeled vapour pressure graph.

   ii)   Consider separate solutions of 0.5 M CH_3OH, 0.250 M KCl (aq) and 0.125 M Na_3PO_4 (aq). Arrange the above solutions in the increasing order of their Van't Hoff factor.

13. Write the Nernst equationand calculate the emffor the following cell at 298 K:

   $Mg(s) / Mg^{2+}$ (0.001 M) // Cu^{2+} (0.0001 M) / Cu(s)

   How does E_{cell}vary with the concentration of both Mg^{2+} and Cu^{2+} ions?

   (GivenE^o_{cell}= 2.71 V)

14. Explain the following observations giving appropriate reasons:

   (i)   Ozone is thermodynamically unstable with respect to oxygen. .

   (ii)   The HEH bond angle of the hydrides of group 15 elements decrease as we move down the group.

   (iii)   Bleaching effect of chlorine is permanent.

15.

   (i)   Predict the number of unpaired electrons in the tetrahedral $[MnBr_4]^{2-}$ ion.

   (ii)   Draw structures of geometrical isomers of $[Co(NH_3)_4Cl_2]^+$.

   (iii)   Write the formula for the following coordinate compound:

   Amminebromidochloridonitrito-N-platinate(II)

16. Explain what is observed when

   (i)   Silver nitrate solution is added to potassium iodide solution.

   (ii)   The size of the finest gold sol particles increases in the gold sol.

   (iii)   Two oppositely charged sols are mixed in almost equal proportions.

17.

(i) In the following pairs of halogen compounds, which would undergo S_N1 reaction faster? Explain.

and

(ii) Amongst the isomeric dihalobenzenes which isomer has the highest melting point and why?

(iii) Arrange the following haloalkanes in the increasing order of density. Justify your answer.

CCl_4, CH_2Cl_2 and $CHCl_3$.

18. An organic compound (A) has characteristic odour. On treatment with NaOH, it forms compounds (B) and (C). Compound (B) has molecular formula C_7H_8O which on oxidation gives back (A). The compound (C) is a sodium salt of an acid. When (C) is treated with soda-lime, it yields an aromatic compound (D). Deduce the structures of (A), (B), (C) and (D). Write the sequence of reactions involved.

19. (a)   Give one chemical test to distinguish between the following pairs of compounds:

(i)   Methylamine and dimethylamine.

(ii)   Aniline and benzylamine

(b) Write the structures of different isomers corresponding to the molecular formula C_3H_9N, which will liberate nitrogen gas on treatment with nitrous acid.

20. (a)   Exemplify the following reactions:

(i)   Rosenmund reduction reaction.

(ii)   Kolbe electrolysis reaction.

(b)   Arrange the following compounds in increasing order of their reactivity towards HCN:

Acetaldehyde, Acetone, Di-tert-butyl ketone.

OR

(a)   Predict the products of the following reactions:

(i)

$$CH_3\text{-}CH_2\text{-}COOH \xrightarrow[\text{(ii) } H_2O]{\text{(i) } Cl_2 \text{ / Red phosphorous}}$$

(ii)

$+ \quad CrO_2Cl_2 \xrightarrow[\text{(ii) } H_3O^+]{\text{(i) } CS_2}$

(b)   Arrange the following compounds in increasing order of acid strength:

Benzoic acid, 4-Nitrobenzoic acid, 4-Methoxybenzoic acid.

21.

(i)   Identify the monomer in the following polymeric structure:

(ii)   On the basis of forces between their molecules in a polymer to which class does

neoprene belong?

(iii)   Can both addition and condensation polymerization result in the formation of a co-

polymer?

22.

(i)   Which of the following biomolecule is insoluble in water? Justify.

Insulin, Haemoglobin, Keratin.

(ii)   Draw the Haworth structure for α-D-Glucopyranose.

(iii)   Write chemical reaction to show that glucose contains aldehyde as carbonyl group.

23.   John had gone with his mother to the doctor as he was down with fever. He then went to the chemist shop with his mother to purchase medicines prescribed by the doctor. There he observed a young man pleading with the chemist to give him medicines as he had nasal congestion. The chemist gave him cimetidine. John advised and also explained to the young man that he should only take the medicines prescribed by the doctor.

Answer the following questions:

a)   Did the chemist give an appropriate medicine? Justify your answer.

b) John's action was appreciated by his mother. List any two reasons.

24.   (a)   Write the mechanism of hydration of ethene to form ethanol.

(b)   How are the following conversions carried out?

(i)   Propanol to propan-2-ol.

(ii)   Propanol to 1-propoxypropane.

(c)   Give the structure and the IUPAC name of the major product obtained in the following reaction:

OH → conc. HNO_3

OR

(a)   Write the mechanism of the reaction of HI with methoxymethane.

(b)   Identify A and B in the following reactions:

(i)

OH → NaOH → A $\xrightarrow[\text{(ii)}\ H^+]{\text{(i)}\ CO_2}$ B

(ii)

$C_2H_5OH \xrightarrow{\text{Cu, 573 K}}$ A $\xrightarrow[H_2O / H^+]{CH_3MgBr}$ B

(c)   Give the structure and the IUPAC name of the major product obtained in the following reaction:

OC_2H_5 $\xrightarrow[\text{conc. } H_2SO_4]{\text{conc. } HNO_3}$

25. (a)   A blackish brown coloured solid (A) which is an oxide of manganese, when fused with alkali metal hydroxide and an oxidizing agent like KNO_3, produces a dark green coloured

compound (B). Compound (B) on disproportionation in neutral and acidic solution gives a purple coloured compound (C). Identify A, B and C and write the reaction involved when compound (C) is heated to 513 K.

(b)

    (i) $E^0\ M^{3+}/M^{2+}$ values for the first series of transition elements are given below. Answer the question that follows:

E^0 (V)	Ti	V	Cr	Mn	Fe	Co
M^{3+}/M^{2+}	-0.37	-0.26	-0.41	+1.57	+0.77	+1.97

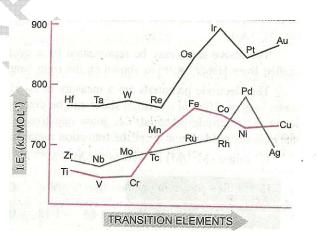   Identify the two strongest oxidizing agents in the aqueous solution from the above data.

    ii)   Copper (I) ion is not known in aqueous solution

    iii)   The highest oxidation state of a metal is exhibited in its oxide.

<div align="center">OR</div>

(a)   Write balanced equations to represent what happens when

(i) Cu^{2+} is treated with KI.

(ii) Acidified potassium dichromate solution is reacted with iron (II) solution. (ionic equation)

(b)

    i)   The figure given below illustrates the first ionization enthalpies of first, second and third series of transition elements. Answer the question that follows

Which series amongst the first, second and third series of transition elements have the highest first ionization enthalpy and why?

ii)   Separation of lanthanide elements is difficult. Explain.

iii) Sm^{2+}, Eu^{2+} and Yb^{2+} ions in solutions are good reducing agents but an aqueous solution of Ce^{4+} is a good oxidizing agent. Why?

26.

i)   Graphically explain the effect of temperature on the rate constant of reaction? How can this temperature effect on rate constant be represented quantitatively?

ii)   The decomposition of a hydrocarbon follows the equation
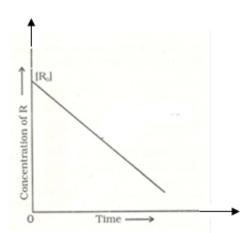
$$k = (4.5 \times 10^{11} \ s^{-1}) \ e^{-28000K/T}$$

Calculate E_a

OR

i)   In the reaction

Q + R → Products

The time taken for 99% reaction of Q is twice the time taken for 90% reaction of Q. The concentration of R varies with time as shown in the figure below:

What is the overall order of the reaction? Give the units of the rate constant for the same. Write the rate expression for the above reaction.

ii)   Rate constant for a first order reaction has been found to be 2.54 x 10^{-3}s-1. Calculate its three-fourth life.