Academic Resource Centre

1/3, Near SAP Theatre, Tirupur - 641603

CHEMISTRY TEST 1

Class 12 - Chemistry

Time Allowed: 3 hours **Maximum Marks: 70**

General Instructions:

Read the following instructions carefully.

1. There are **33** questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 very short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. **All questions are compulsory.**
8. **Use of log tables and calculators is not allowed.**

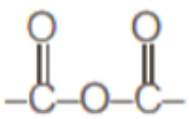
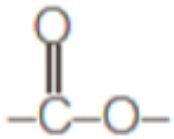
Section A

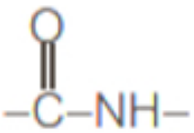
1. Which one of the following compounds is more reactive towards S_N1 reaction? **[1]**

   a) $C_6H_5CH_2Br$ b) $C_6H_5CH(CH_3)Br$

   c) $C_6H_5CH(C_6H_5)Br$ d) $CH_2 = CHCH_2Br$

2. Which of the following bonds is found in proteins and peptides? **[1]**

   a)  b) 

   c)  d) $-NH-$

3. One mole of an organic compound 'A' with the formula C_3H_8O reacts completely with two moles of HI to form X and Y. When 'Y' is boiled with aqueous alkali forms Z. Z answers the iodoform test. The compound 'A' is _____. **[1]**

   a) methoxyethane b) Propan – 1 – o1

   c) ethoxyethane d) Propan – 2 – o1

4. Aldehydes and ketones react with hydroxylamine to form **[1]**

   a) Oxime b) cyanohydrins

c) hydrazones

d) semicarbazones

5. Why is the minimum energy needed for an effective collision? **[1]**

a) A minimum energy is needed, so that the particles will collide many times per second.

b) Energy is needed to break bonds.

c) Energy is needed to orient the particles correctly.

d) Enough energy is needed to give off heat in a reaction.

6. Match the item given in Column I with expression given in Column II. **[1]**

Column I	Column II
(a) Osmotic Pressure	(i) $p = K_H \cdot \chi_B$
(b) Relative lowering of vapour pressure	(ii) $\frac{\triangle P}{P^o_A} = \chi_B$
(c) Henry Law	(iii) $\triangle T_b = K_b . m$
(d) Elevation in boiling point	(iv) p = iCRT

a) (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i).

b) (a) - (iii), (b) - (i), (c) - (ii), (d) - (iv).

c) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i).

d) (a) - (iv), (b) - (ii), (c) - (i), (d) - (iii).

7. Which one of the following is a synthetic halogen compound? **[1]**

a) Diphenyl hydramine

b) Omeprazole

c) Chloramphenicol

d) Chloroquine

8. Which of the following is a strong oxidising agent? **[1]**
(At. No. Mn = 25, Zn = 30, Cr = 24, Sc = 21)

a) Sc^{3+}

b) Zn^{2+}

c) Cr^{3+}

d) Mn^{3+}

9. The role of a catalyst is to change _____. **[1]**

a) equilibrium constant

b) enthalpy of reaction

c) gibbs energy of reaction

d) activation energy of reaction

10. The oxidation of toluene to benzaldehyde by chromyl chloride is called **[1]**

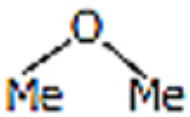
a) Stephen's reaction

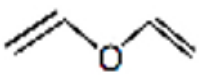
b) Riemer-Tiemann reaction

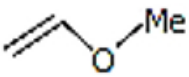
c) Cannizzaro's reaction

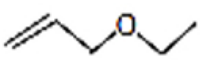
d) Etard reaction

11. The ether in which all atoms may exist in one plane is **[1]**

a) 

b) 

c) 

d) 

12. Which of the following has highest boiling point? **[1]**

a) CH_3CH_3

b) CH_3OH

c) CH_3NH_2 d) HCOOH

13. **Assertion (A):** Insulin is a globular protein. **[1]**

Reason (R): Gum is a polymer of more than one type of monosaccharides.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

14. **Assertion (A):** Isobutanal does not give the iodoform test. **[1]**

Reason (R): It does not have alpha-hydrogen.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

15. **Assertion (A):** Tert-butyl bromide undergoes S_N1 nucleophilic substitution readily than n-butyl bromide. **[1]**

Reason (R): It proceeds by the formation of stable carbocation.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

16. **Assertion (A):** The pKa of O_2N-CH_2-COOH is lower than that of CH_3-COOH. **[1]**

Reason (R): -NO_2 group shows electron withdrawing effect which increases the acidic character of O_2N-CH_2-COOH.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

Section B

17. Calculate the temperature at which the solution containing 54 g of glucose, $C_6H_{12}O_6$ in 250 g of water will freeze. (K_b for water = 1.86 $K\ kg\ mol^{-1}$) **[2]**

OR

Why do gases always tend to be less soluble in liquids as the temperature is raised?

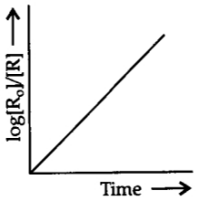
18. The spin only magnetic moment of $[MnBr_4]^{2-}$ is 5.9 BM. Predict the geometry of the complex ion? **[2]**

19. Write the balanced ionic equations showing the oxidising action of acidified dichromate ($Cr_2O_7^{2-}$) solution with **[2]**

i. Iron (II) Ion and
ii. tin (II) ion.

20. **Answer the following:** **[2]**

(a) For a chemical reaction R $\rightarrow$ P, variation in log $\frac{[Ro]}{[R]}$ vs time plot is given below: **[1]**



For this reaction:

i. Predict the order of reaction

ii. What is the unit of rate constant (k)?

(b) Express the rate of the following reaction in terms of disappearance of hydrogen in the reaction. **[1]**

$3H_2(g) + N_2(g) \rightarrow 2NH_3(g)$

21. Draw the structure of 4-methylpent-3-en-2-one. **[2]**

Section C

22. Silver is deposited on a metallic vessel by passing a current of 0.2 amps. for 3 hrs. Calculate the weight of silver deposited. (At mass of silver = 108 amu,1 F = 96500 C)? **[3]**

23. A reaction is first order in A and second order in B. **[3]**

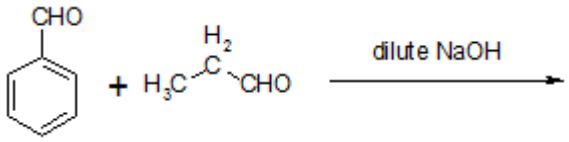
a. Write the differential rate equation.

b. How is the rate affected on increasing the concentration of B three times?

c. How is the rate affected when the concentrations of both A and B are doubled?

24. Why -OH group in phenols is more strongly held as compared to -OH group in alcohol? **[3]**

25. Complete each synthesis by giving missing starting material, reagent or products. **[3]**



26. Calculate the equilibrium constant for the reaction at T=298 K. **[3]**

$Fe(s) + Cd^{2+}(aq) \rightarrow Fe^{2+}(aq) + Cd(s)$

$\left[\text{Given, } E^{\Theta}_{Cd^{2+}/cd} = -0.40V, E^{\Theta}_{Fe^{2+}/Fe} = -0.44V\right]$

27. A hydrocarbon C_5H_{10} does not react with chlorine in dark but gives a single monochloro compound C_5H_9Cl in bright sunlight. Identify the hydrocarbon. **[3]**

28. Three iron sheets have been coated separately with three metals (A, B and C) whose standard electrode potentials are given below: **[3]**

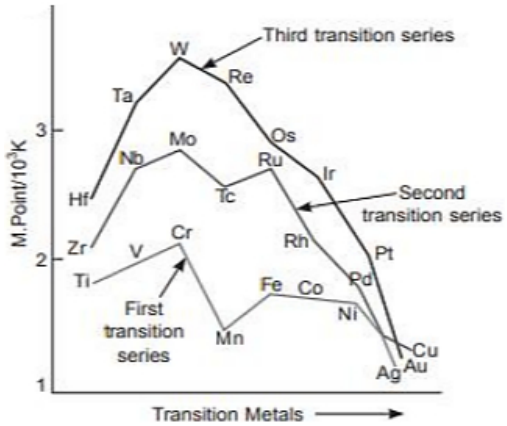
MetaI	**A**	**B**	**C**
E^0_{value}	-0.46	-0.66V	- 0.20 V

Note: Electrode potential of Iron (-0.44V)

Section D

29. **Read the following text carefully and answer the questions that follow:** **[4]**

Observe the graph of transition metal and their melting points



i. Why does W (tungsten) has highest melting point? (1)

ii. Which element in 3d series has lowest enthalpy of atomisation and why? (1)

iii. Why is mercury liquid? (2)

OR

Why are transition metals less electropositive than 's'-block elements? (2)

30. **Read the following text carefully and answer the questions that follow:** **[4]**

The solutions which boil at a constant temperature like a pure liquid and possess the same composition in liquid, as well as vapour state are called azeotropes. The components of azeotropes cannot be separated by fractional distillation. Only non-ideal solutions form azeotropes. Solutions with negative deviation form maximum boiling azeotrope and the solutions with positive deviation form minimum boiling azeotrope. The boiling point of azeotrope is never equal to the boiling points of any of the components of the azeotrope.

i. The azeotropic solutions of two miscible liquids show what type of deviation from Raoult's law? (1)

ii. The azeotropic mixture of water & HCI boils at $108.5^{\circ}C$. What type of deviation is shown by the solution? Does this solution behave as ideal or non-ideal? (1)

iii. Do ideal solutions form azeotropes? (2)

OR

Out of pure liquid and azeotrope showing positive deviation, Which one has a higher boiling point? (2)

Section E

31. **Attempt either A or B** **[5]**

(a) **Answer the following questions:**

i. Name the deficiency disease resulting from lack of vitamin A and E in the diet. **[1]**

ii. What are the hydrolysis products of sucrose? **[1]**

iii. What is the structural feature characterising reducing sugars? **[1]**

iv. What type of substance is phenylanine hydroxylate? Write its importance. **[1]**

v. Define the following terms: **[1]**

a. Essential amino acids

b. Nucleotide

(b) **Answer the following questions:**

i. What type of linkage holds together the monomers of DNA? **[1]**

ii. a. How can you explain the absence of an aldehyde group in the pentaacetate of D-glucose? **[1]**

b. Name the bases present in RNA. Which one of these is not present in DNA?

iii. Write the full forms of DNA and RNA. **[1]**

iv. a. Write chemical reaction to show that open structure of D-glucose contains the straight chain. **[1]**

b. What type of linkage is responsible for the formation of protein?

v. i. What is the difference between a nucleoside and nucleotide? **[1]**

ii. Write one difference between α-helix and β-pleated sheet structures of protein.

32. **Attempt either A or B** **[5]**

(a) **Answer the following questions:**

i. What is the difference between an ambidentate ligand and bidentate ligand? **[1]**

ii. What is the shape of $[Cr(NH_3)_6]^{3+}$complex ion? **[1]**

iii. What type of isomerism is shown by the complex $[Co(NH_3)_5\ NO_2]Cl_2$? **[1]**

iv. Write the coordination isomer of $[Cu(NH_3)_4]\ [PtCI_4]$. **[1]**

v. Write the formula of copper hexacyanoferrate (II). **[1]**

(b) **Answer the following questions:**

i. What is the difference between a complex and a double salt? **[1]**

ii. Define oxidation state of a metal. **[1]**

iii. Write IUPAC name of the complex $K_3[Cr(C_2O_4)_3]$ **[1]**

iv. a. Why is $[Ti(H_2O)_6]^{3+}$ coloured? **[1]**

b. Write IUPAC name of the given complex:
$K_3[Cr(C_2O_4)_3]$

v. Draw the structures of optical isomers of $[PtCl_2(en)_2]^{2+}$. **[1]**

33. Arrange the following compounds in a decreasing order of basic strength in their aqueous solutions. **[5]**
NH_3, CH_3NH_2, $(CH_3)_2NH$, $(CH_3)_3N$

OR

a. Give plausible explanation for each of the following:

i. Why are amines less acidic than alcohols of comparable molecular masses?

ii. Why are primary amines highest boiling than tertiary amines?

iii. Why are aliphatic amines stronger bases than aromatic amines?

b. Complete the following reactions:

i. $C_6H_5N_2Cl + C_2H_5OH \rightarrow$

ii. $C_6H_5NH_2 + (CH_3CO)_2O \rightarrow$