

**ISC SEMESTER 2 EXAMINATION  
SPECIMEN QUESTION PAPER  
CHEMISTRY PAPER 1 (THEORY)**

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*Maximum Marks: 35*

*Time allowed: One and a half hour*

*Candidates are allowed an additional 10 minutes for only reading the paper.*

*They must NOT start writing during this time.*

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**All questions are compulsory**

*The intended marks for questions or parts of questions are given in brackets. [ ]*

*All working, including rough work, should be done on the same sheet as, and adjacent to the rest of the answer.*

*Balanced equations must be given wherever possible and diagrams where they are helpful.*

*When solving numerical problems, all essential working must be shown.*

*In working out problems, use the following data:*

*Gas constant  $R = 1.987 \text{ cal deg}^{-1} \text{ mol}^{-1} = 8.314 \text{ JK}^{-1} \text{ mol}^{-1} = 0.0821 \text{ dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$*

*$1 \text{ l atm} = 1 \text{ dm}^3 \text{ atm} = 101.3 \text{ J}$ .  $1 \text{ Faraday} = 96500 \text{ coulombs}$ .*

*Avogadro's number =  $6.023 \cdot 10^{23}$ .*

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**SECTION A – 7 MARKS**

**Question 1**

**Fill in the blanks by choosing the appropriate word(s) from those given in the brackets:**

(two, four,  $\text{sec}^{-1}$ , diamagnetic, acetaldehyde,  $\text{mol}^{-1}\text{L sec}^{-1}$ , paramagnetic, formaldehyde, acetone, ethanol)

- (i) When the concentration of a reactant of first order reaction is doubled, the rate of reaction becomes \_\_\_\_\_ times. The unit of rate constant (k) for the first order reaction is \_\_\_\_\_. [1]
- (ii) The transition metals show \_\_\_\_\_ character because of the presence of unpaired electrons while  $\text{Cu}^+$  is \_\_\_\_\_ because its electronic configuration is  $[\text{Ar}]3d^{10}$ . [1]
- (iii) Calcium formate on distillation gives \_\_\_\_\_ but the distillation of calcium formate and calcium acetate gives \_\_\_\_\_. [1]

## Question 2

Select and write the correct alternative from the choices given below.

- (i) The type of hybridization involved in Octahedral complexes is: [1]
- (a)  $sp^3$
  - (b)  $dsp^2$
  - (c)  $sp^3d$
  - (d)  $d^2sp^3$
- (ii) One mole of a symmetrical alkene on ozonolysis gives two moles of an aldehyde having a molecular mass of 44 amu. The alkene is: [1]
- (a) ethene
  - (b) propene
  - (c) 1-butene
  - (d) 2-butene
- (iii) Primary amine when warmed with chloroform and alc. KOH yields: [1]
- (a) cyanides
  - (b) isocyanides
  - (c) benzene diazonium chloride
  - (d) secondary amines
- (iv) **Assertion:** The conversion of fresh precipitate to colloidal state is called peptization. [1]  
**Reason:** It is caused by addition of common ions.
- (a) Both assertion and reason are true and reason is the correct explanation of assertion.
  - (b) Both assertion and reason are true but reason is not the correct explanation for assertion.
  - (c) Assertion is true but reason is false.
  - (d) Assertion is false but reason is true.

## SECTION B – 16 MARKS

### Question 3 [2]

Name the type of isomerism shown by each of the following pairs of compounds:



### Question 4 [2]

(i) Write chemical equations to illustrate each of the following name reactions:

(a) Rosenmund's reduction

(b) Clemmensen's reduction

OR

(ii) How will you bring about the following conversions? (Give equation).

(a) Acetic acid to acetone

(b) Formaldehyde to urotropine

### Question 5 [2]

What is a *zwitter ion*? Represent the zwitter ion of glycine.

### Question 6 [2]

(i) Arrange the following in the increasing order of their basic strength:  $\text{C}_2\text{H}_5\text{NH}_2$ ,  $\text{C}_6\text{H}_5\text{NH}_2$ ,  $(\text{C}_2\text{H}_5)_2\text{NH}$ .

(ii) What are the products formed when benzene diazonium chloride reacts with phenol in weak alkaline medium? (Give equation).

### Question 7 [2]

Give reasons for the following:

(i) Diabetic patients are advised to take artificial sweeteners instead of natural sweeteners.

(ii) The use of aspartame is limited to cold foods and drinks.

**Question 8****[2]**

The rate of reaction becomes four times when the temperature changes from 293K to 313K. Calculate the energy of activation ( $E_a$ ) of the reaction assuming that it does not change with temperature. ( $R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$ )

**Question 9****[2]**

Give balanced equation for each of the following:

- (i) Ethylamine and nitrous acid
- (ii) Aniline and acetyl chloride

**Question 10****[2]**

Give one chemical test for each to distinguish between the following pairs of compound:

- (i) Acetaldehyde and benzaldehyde
- (ii) Acetone and acetic acid

**SECTION C – 12 MARKS****Question 11****[3]**

(i) **Answer the following:**

- (a) Define molecularity of a reaction. Give one difference between the order of reaction and its molecularity.
- (b) The rate constant ( $k$ ) of a first order reaction is  $4.5 \times 10^{-2} \text{ sec}^{-1}$ . What will be the time required for the initial concentration of 0.4 M of the reactant to be reduced to 0.2 M?

**OR**

(ii) **Answer the following:**

- (a) For a first order reaction, show that the time required for the completion of 99% reaction is twice the time required for the completion of 90% of the reaction.
- (b) For a reaction,  $\text{rate} = k[\text{A}]^1[\text{B}]^{1.5}[\text{C}]^0$ . What is the overall order of reaction?

**Question 12** **[3]**

- (i) What is the basic difference between the *electronic configuration of transition and inner transition elements*?
- (ii) Why are  $Zn^{2+}$  ions colourless while  $Ni^{2+}$  ions are green in colour?

**Question 13** **[3]**

- (i) Write the formula of each of the following compounds:
  - (a) Potassium trioxalatoaluminate (III)
  - (b) Triammine triaquachromium (III) chloride
- (ii) For the complex ion  $[Co(NH_3)_6]^{3+}$ , state the oxidation state of central metal atom and the coordination number of the complex ion.

**Question 14** **[3]**

Give reason for each of the following:

- (i) For ferric hydroxide sol. the coagulating power of phosphate ion is more than chloride ion.
- (ii) Lyophilic colloidal solutions are more stable than lyophobic colloidal solutions.
- (iii) Gelatin is added to ice cream.