

D-9-Y

Roll No.

Total No. of Questions : 4]

[Total No. of Printed Pages : 8

12thARM(H/Z)JKUTL2024-25

609-Y

CHEMISTRY

Time : 3 Hours]

[Maximum Marks : 70

General Instructions :

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- (ii) **Section-A** contains 10 Objective Type Questions (Multiple Choice Questions) of 1 mark each. $1 \times 10 = 10$ marks
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 $2 \times 9 = 18$ marks
- (iv) **Section-C** contains 9 Short Answer Type Questions of 3 marks each to be answered in 100-150 words. $3 \times 9 = 27$ marks
- (v) **Section-D** contains 3 Long Answer Type Questions of 5 marks each to be answered in 150-200 words. $5 \times 3 = 15$ marks
- (vi) Use log tables if necessary. Use of scientific calculators is not allowed.

12thARM(H/Z)JKUTL2024-25-609-Y

D-9-Y

Turn Over

SECTION-A

1 each

OBJECTIVE TYPE QUESTIONS
(MULTIPLE CHOICE QUESTIONS)

1. Choose the correct answer and write in your answer book :

(i) The molarity of pure water is :

(A) 5.556 mol/litre.

(B) 55.56 mol/litre

(C) 18 mol/litre

(D) 0.18 mol/litre

(ii) Isotonic solutions are solutions having the same :

(A) Surface tension

(B) Vapour pressure

(C) Osmotic pressure

(D) Viscosity

(iii) The units of cell constant are :

(A) Ohm^{-1}

(B) Ohm-cm .

(C) Cm^{-1}

(D) $\text{Ohm}^{-1} \text{ cm}^2 \text{ equiv.}^{-1}$

(3)

(iv) The specific rate for a reaction is $1.0 \times 10^{-4} \text{ mol L}^{-1} \text{ min}^{-1}$.

The order of the reaction is :

(A) Zero

(B) One

(C) Two

(D) Three

(v) Half-life period of any first order reaction is :

(A) Directly proportional to the initial concentration of the reactants

(B) Half of the rate constant

(C) Same for all reactions

(D) Independent of initial concentration of reactants

(vi) The maximum oxidation state of osmium is :

(A) +6

(B) +7

(C) +8

(D) +5

(vii) The brand name of dichlorodifluoromethane is :

- (A) Westron
- (B) Westrosol
- (C) Freon
- (D) DDT

(viii) Ethers are isomeric with :

- (A) Aldehydes
- (B) Alcohols
- (C) Vinyl alcohols
- (D) Ketones

(ix) Which of the following compounds does not have a carboxyl group ?

- (A) Benzoic acid
- (B) Palmitic acid
- (C) Picric acid
- (D) Oleic acid

(x) Fructose is a :

- (A) Aldose
- (B) Ketose
- (C) Both aldose and ketose
- (D) None of these

SECTION-B

2 each

VERY SHORT ANSWER TYPE QUESTIONS

2. (i) Define rate law with an example.
- (ii) Name the type of isomerism exhibited by the following isomers :
- (a) $[\text{Co}(\text{NH}_3)_6(\text{Cr}(\text{CN})_6)] - [\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$
- (b) $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)\text{Cl}]\text{Cl}_2 - [\text{Co}(\text{NH}_3)_5(\text{ONO})\text{Cl}_2]$
- (iii) Define the following with examples :
- (a) Cationic complex
- (b) Anionic complex
- (iv) Give *two* uses and *two* environmental effects of trichloromethane.
- (v) Why alcohols have higher boiling points than hydrocarbons of corresponding molecular masses but have lower boiling points than corresponding carboxylic acids ?
- (vi) Describe Cannizaro's reaction.
- (vii) Why methyl amine is more basic than ammonia ?
- (viii) How is aniline prepared from chlorobenzene ?
- (ix) What are cyanides and isocyanides ? Give examples in each case.

SECTION-C

3 each

SHORT ANSWER TYPE QUESTIONS

3. (i) Distinguish between potential difference and E.M.F.
- (ii) With the help of valence bond theory compare the magnetic behaviour of $[\text{Co}(\text{NH}_3)_6]^{3+}$ and $[\text{CoF}_6]^{3-}$ complex ions.
- (iii) State and explain the concept of activation energy.
- (iv) What are transition elements ? Why are they called *d*-block elements ? Write the electronic configuration of the first and last member of 3*d*-series.
- (v) Compare the chemistry of actinoids with that of lanthanoids with special reference to :
- Electronic configuration
 - Chemical reactivity.
- (vi) Explain the nature of C-X bond in case of haloalkanes.
- (vii) What happens to primary, secondary and tertiary alcohols when they are dehydrogenated ?
- (viii) Explain mutarotation with an example.
- (ix) What are proteins ? How are they classified on the basis of molecular structure ?

SECTION-D

5 each

LONG ANSWER TYPE QUESTIONS

4. (i) What are ideal and non-ideal solutions ? Illustrate with the help of diagrams, types of non-ideal solutions. Explain the reasons for negative and positive deviations.

Or

What is depression in freezing point ? Show that depression in freezing point is a colligative property. Derive the relationship between depression in freezing point and molar mass of solute. <https://www.jkboseonline.com>

- (ii) Define electrochemical cell. Discuss the construction and working of Galvanic cell. How is Galvanic cell represented ?

Or

What is meant by corrosion ? Name the important factors affecting corrosion. Explain electrochemical theory of rusting.

- (if) (a) Give any *three* methods of preparation of aldehydes.
- (b) How is acetone prepared from (i) acid chloride and
(ii) calcium acetate ?

Or

How will you convert ?

- (a) (i) Benzoic acid into benzyl alcohol.
- (ii) Benzoic acid into 3-nitrobenzoic acid.
- (iii) Benzoic acid into methyl benzoate.
- (b) Give important uses of carboxylic acids.

B-9-Z

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B-9-Z

Turn Over

SECTION-A

1 each

OBJECTIVE TYPE QUESTIONS
(MULTIPLE CHOICE QUESTIONS)

1. Select the correct one :

- (i) The molarity of an aqueous solution of NaOH containing 8 g in 2 litre of the solution is :
- (A) 0.1 M
- (B) 0.2 M
- (C) 0.25 M
- (D) 0.15 M
- (ii) Which of the following aqueous solutions do you expect have the lowest freezing point ?
- (A) 0.1 m glucose ($C_6H_{12}O_6$)
- (B) 0.1 m NaCl
- (C) 0.1 m sucrose ($C_{12}H_{22}O_{11}$)
- (D) 0.1 m $BaCl_2$

(iii) The reduction potential of an electrode :

- (A) Increases with increase in concentration of ions
- (B) Decreases with increase in concentration of ions
- (C) Remains unaffected with increase in concentration of ions
- (D) Increases with increase of temperature

(iv) The unit of rate constant for a zero order reaction is :

- (A) litre sec^{-1}
- (B) litre $\text{mol}^{-1} \text{sec}^{-1}$
- (C) mol litre $^{-1} \text{sec}^{-1}$
- (D) mol sec^{-1}

(v) Among the following the most reactive alkyl halide is :

- (A) $\text{C}_2\text{H}_5\text{F}$
- (B) $\text{C}_2\text{H}_5\text{Cl}$
- (C) $\text{C}_2\text{H}_5\text{Br}$
- (D) $\text{C}_2\text{H}_5\text{I}$

(vi) Ethyl alcohol can be distinguished from phenol by :

- (A) Action of HCl
- (B) Action of aqueous FeCl_3 solution
- (C) Action of ammonia
- (D) Action of acetic acid

(vii) Aniline on reaction with Acetyl chloride gives :

- (A) Phenol
- (B) Acetamide
- (C) Acetanilide
- (D) Benzene

(viii) Which of the following ligands is not a chelating agent ?

- (A) EDTA
- (B) Ethylenediamine
- (C) Oxalate
- (D) Pyridine

(ix) Pentose sugar present in RNA is :

- (A) Glucose
- (B) Deoxyribose
- (C) Ribose
- (D) Fructose

(x) Vitamin E is also called :

- (A) Cyanocobalamin
- (B) Tecopherol
- (C) Lactoflavin
- (D) Ascorbic acid

SECTION-B

2 eac

VERY SHORT ANSWER TYPE QUESTIONS

2. (i) A first order reaction is found to have a rate constant $k = 2.39 \times 10^{-5} \text{ s}^{-1}$. Find the half-life of this reaction.

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B-9-Z

- (ii) Why are transition elements known as *d*-block elements ?
- (iii) Direct nitration of aniline is not carried out at all. Explain why.
- (iv) What is absolute alcohol ?
- (v) What are essential and non-essential amino acids ?
- (vi) Write the IUPAC names of :
 - (a) $\text{Zn}_2[\text{Fe}(\text{CN})_6]$
 - (b) $[\text{Pt}(\text{NH}_3)_4\text{Cl}_2]^{2+}$
- (vii) Define rate of reaction and rate constant.
- (viii) Why cannot molecularity of any reaction be equal to zero ?
- (ix) Give a brief account of Wurtz reaction.

SECTION-C

3 each

SHORT ANSWER TYPE QUESTIONS

3. (i) How is Grignard reagent used to prepare tertiary butyl alcohol ?
- (ii) Define Kohlrausch's law. How can it be used to find the degree of dissociation of a weak electrolyte ?

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- (iii) Explain, why transition metal ions usually show paramagnetic behaviour ?
- (iv) What happens when acidified KMnO_4 reacts with (a) H_2S (b) Oxalic acid (c) KNO_2 ?
- (v) Define cis and trans isomerism. Draw the cis and trans isomers of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ ion. <https://www.jkboseonline.com>
- (vi) How do you convert ethylbromide to ?
- (a) Ethoxyethane
- (b) Ethane
- (c) Ethanol
- (vii) How will you distinguish between primary, secondary and tertiary alcohols by Victor Meyer's test ? Give chemical reactions.
- (viii) What is Diazotisation ? Discuss its mechanism.
- (ix) What are Carbohydrates ? How are they classified ?

SECTION-D

5 each

LONG ANSWER TYPE QUESTIONS

4. (i) State and explain Raoult's law for (a) volatile solute (b) non-volatile solute.

Or

What do you understand by Colligative properties of a solution ?
Explain briefly osmosis and osmotic pressure.

- (ii) What is an electrochemical cell ? Describe working of Daniell cell.

Or

What is Corrosion ? Give mechanism (electrochemical phenomenon) of rusting of iron. What do you understand by cathodic and barrier protection of corrosion ?

- (iii) Describe any five general methods of preparations of carboxylic acids.

Or

Giving chemical equations write a brief account of the following :

- (a) Aldol condensation
- (b) Cannizzaro reaction
- (c) Rosenmund reduction

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309-Y

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Turn Over

B-9-Y

SECTION-A

1 each

OBJECTIVE TYPE QUESTIONS
(MULTIPLE CHOICE QUESTIONS)

1. Select the correct one :

(i) Which one of the following is not the correct unit of molal elevation constant ?

(A) $^{\circ}\text{C}/\text{m}$

(B) K/m

(C) K kg mol^{-1}

(D) K mol kg^{-1}

(ii) Which of the following solutions will have the maximum lowering of vapour pressure at 300 K ?

(A) 1 m NaCl

(B) 1 m BaCl_2

(C) 1 m Sucrose

(D) 1 m Phenol

(iii) The electrode potential of a half cell depends upon :

- (A) Nature of metal
- (B) Concentration metal ions in solution
- (C) Temperature
- (D) All the three above

(iv) The rate constant of a reaction has same units as the rate of reaction. The reaction is of :

- (A) Zero order
- (B) First order
- (C) Second order
- (D) None of these

(v) S_N^2 mechanism proceeds through intervention of :

- (A) Carbonium ion
- (B) Transition state
- (C) Free radical
- (D) Carbanion

(vi) Phenol on reduction with H_2 in presence of nickel catalyst gives :

- (A) Benzene
- (B) Toluene
- (C) Cyclohexane
- (D) Cyclohexanol

(vii) Which of the following gives carbylamine reaction ?

- (A) CH_3NH_2
- (B) $C_2H_5NO_2$
- (C) CH_3CONH_2
- (D) $(CH_3)_2NH$

(viii) Ligands are :

- (A) Negative ions only
- (B) Neutral molecules
- (C) Never positive ions

(D) Negative or positive ions or neutral molecules

(ix) Which of the following constitutes the genetic material of the cell ?

(A) Nucleic acid

(B) Proteins

(C) Lipids

(D) Carbohydrates

(x) Vitamin A is called :

(A) Ascorbic acid

(B) Retinol

(C) Calciferol

(D) Tocopherol

SECTION-B

2 eac

VERY SHORT ANSWER TYPE QUESTIONS

2. (i) A first order reaction is found to have a rate constant $k = 5.5 \times 10^{-4} \text{ s}^{-1}$. Find the half-life period.

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Turn Over

- (ii) How many transition series of elements are there in the periodic table ? Name them.
- (iii) What is ammonolysis ? Give example.
- (iv) What is rectified spirit ?
- (v) What are essential and non-essential amino acids ?
- (vi) Write the IUPAC names of :
 - (a) $\text{Zn}_2[\text{Fe}(\text{CN})_6]$
 - (b) $[\text{Pt}(\text{NH}_3)_4\text{Cl}_2]^{2+}$
- (vii) Define rate of reaction and rate constant.
- (viii) Why cannot molecularity of any reaction be equal to zero ?
- (ix) Give a brief account of Wurtz reaction.

SECTION-C

3 each

SHORT ANSWER TYPE QUESTIONS

3. (i) Aldehydes and ketones undergo nucleophilic addition reactions. Justify with examples.
- (ii) Define Kohlrausch's law. How can it be used to find the degree of dissociation of a weak electrolyte ?

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- (iii) Explain, why transition metal ions usually show paramagnetic behaviour ?
- (iv) What happens when acidified KMnO_4 reacts with (a) H_2S
(b) Oxalic acid (c) KNO_2 ?
- (v) Define cis and trans isomerism. Draw the cis and trans isomers of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ ion. <https://www.jkboseonline.com>
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- (b) Ethane
- (c) Ethanol
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- (viii) What is Diazotisation ? Discuss its mechanism.
- (ix) What are Carbohydrates ? How are they classified ?

Turn Over

SECTION-D

5 each

LONG ANSWER TYPE QUESTIONS

4. (i) State and explain Raoult's law for (a) Volatile solute (b) non-volatile solute.

Or

What do you understand by Colligative properties of a solution ?
Explain briefly osmosis and osmotic pressure.

- (ii) What is an electrochemical cell ? Describe working of Daniell cell.

Or

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- (iii) Describe any *five* general methods of preparations of carboxylic acids.

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- (a) Aldol condensation
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B-9-X

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B-9-X

Turn Over

SECTION-A

1 each

**OBJECTIVE TYPE QUESTIONS
(MULTIPLE CHOICE QUESTIONS)****1. Select the correct one :**

(i) The molal elevation constant is the ratio of the elevation in B.P. to :

(A) Molarity

(B) Molality

☒ (C) Mole fraction of solute

(D) Mole fraction of solvent

(ii) Which of the following solutions will have highest boiling point at 1 atm pressure ?

(A) 0.1 m FeCl_3

☒ (B) 0.1 m BaCl_2

(C) 0.1 m NaCl

(D) 0.1 m Urea (NH_2CONH_2)

(iii) Nernst equations give effect of :

- (A) Temperature on EMF
- (B) Concentration on EMF
- (C) Pressure of the gas (if any) on EMF
- ~~(D) All the three above~~

(iv) The rate constant of a reaction is $2.5 \times 10^{-2} \text{ sec}^{-1}$. The order of the reaction is :

- ~~(A) One~~
- (B) Zero
- (C) Two
- (D) Three

(v) S_N^1 reactions occur through the intermediate formations of :

- ~~(A) Carbocation~~
- (B) Carbanions
- (C) Free radical
- (D) None of these

(vi) On heating with Sodalime salicylic acid gives :

☒ (A) Phenol

(B) Benzoic acid

(C) Sodium salicylate

(D) Benzene

(vii) Reduction of nitroethane with LiAlH_4 gives :

(A) Ethyl hydroxylamine

(B) Ethanol

☒ (C) Ethylamine

(D) Ethanamide

(viii) A complex in which dsp^2 hybridisation takes place is :

☒ (A) Square planar

(B) Tetrahedral

(C) Triangular planar

(D) Pyramidal

(ix) Adenosine is example of a :

(A) Nucleotide

~~(B) Nucleoside~~

(C) Purine base

(D) Pyridine base

(x) Which of the following biomolecules contains a non-transition metal ion ?

(A) Haemoglobin

~~(B) Chlorophyll~~

(C) Insulin

(D) Vitamin B₁₂

SECTION-B

2 each

VERY SHORT ANSWER TYPE QUESTIONS

2. (i) Calculate the half-life of a first order reaction from their rate constants given below :

(a) 200 s^{-1}

(b) 2 min^{-1}

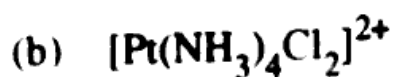
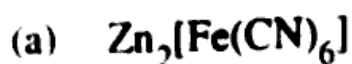
(iii) Why does a transition series consist of 10 elements ?

(iii) Why is an alkylamine more basic than ammonia ?

(iv) What is Lucas reagent ?

(v) What are essential and non-essential amino acids ?

(vi) Write the IUPAC names of :



(vii) Define rate of reaction and rate constant.

(viii) Why cannot molecularity of any reaction be equal to zero ?

(ix) Give a brief account of Wurtz reaction.

SECTION-C

3 each

SHORT ANSWER TYPE QUESTIONS

3. (i) What do you mean by a Nucleophilic addition reaction ? Give its mechanism.

(ii) Define Kohlrausch's law. How can it be used to find the degree of dissociation of a weak electrolyte ?

✓(iii) Explain, why transition metal ions usually show paramagnetic behaviour ?

(iv) What happens when acidified KMnO_4 reacts with (a) H_2S
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