

**SAMPLE CONTENT**

# 10 PRACTICE PAPER SET



IN ACCORDANCE WITH THE LATEST CUET (UG) PAPER CONDUCTED BY

# CUET (UG)

Common University Entrance Test

# CHEMISTRY

Section - II      CODE: 306

## Features:

- ▶ Based on the notified syllabus prescribed by NTA
- ▶ Smart keys provided to crack question efficiently
- ▶ Includes solved CUET (UG) 2022 paper
- ▶ Covers a variety of questions:
  - Passage / Case - Study Based Questions
  - Statement Based Questions
  - Match the Columns

**Target** Publications® Pvt. Ltd.

# 10 PRACTICE PAPER SET

**CUET (UG)**

(Common University Entrance Test)

## CHEMISTRY

### SALIENT FEATURES:

- ☞ Created as per the syllabus prescribed by **NTA**
- ☞ In accordance with the latest CUET (UG) Paper conducted by **NTA**
- ☞ Set of 10 full length Question Papers with Answers and Solutions
- ☞ Exhaustive coverage of all types of questions based on the latest CUET (UG) question paper
- ☞ **Smart Key** provided to crack questions efficiently
- ☞ Includes **Solved Question Paper** of CUET (UG) 2022, 18<sup>th</sup> August (Slot - 2)

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## PREFACE

The Common University Entrance Test, CUET (UG) is a crucial milestone for students as they progress towards their undergraduate education. It is the sole opportunity for them to gain admission into premier undergraduate institutions and courses after the completion of Class XII.

Target Publications, with more than a decade of experience and expertise in the domain of competitive examination, offers ‘**CUET (UG) 10 Practice Paper Set**’ – Chemistry for CUET (UG) aspirants, which is a meticulously designed book to assess the threshold of knowledge imbibed by students.

This book charts out a compilation of 10 Practice Papers aimed at students appearing for the CUET (UG) examination. Every question paper in this book has been created in line with syllabus prescribed by NTA for CUET (UG) Chemistry.

Each paper covers various question types (*Passage/Case-Study Based Questions, Match the Columns, Statement Based Questions*) based on CUET (UG) - 2022 question paper and touches upon all the conceptual nodes of Chemistry. The questions throughout this book are specifically curated by our expert authors with an astute attention to detail. The core objective of this book is to gauge the student’s preparedness to appear for CUET (UG) examination.

To aid students, **Solutions** are provided as deemed necessary. **Smart Keys** are provided selectively to encourage cracking a question efficiently by lateral thinking. **Question paper of CUET (UG) 2022**, 18<sup>th</sup> August (Slot - 2) is provided along with solution to offer students a glimpse of the complexity of questions asked in entrance examination. The paper has been split topic wise to let the students know which of the topics were more relevant in the latest examination.

Apart from mastery on the subject content, we hope that this book will also help students to achieve objectives such as time-management and develop their ability to utilize the paper-pattern format (choice of questions to attempt) to their advantage in order to maximize their scores.

*We hope that the book helps the learners as we have envisioned.*

Publisher

**Edition:** First

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we’ve nearly missed something or want to applaud us for our triumphs, we’d love to hear from you. Please write to us on: [mail@targetpublications.org](mailto:mail@targetpublications.org)

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### Disclaimer

This reference book is based on the CUET (UG) official syllabus prescribed by National Testing Agency (NTA). We the publishers are making this reference book which constitutes as fair use of textual contents which are transformed by adding and elaborating, with a view to simplify the same to enable the students to understand, memorize and reproduce the same in examinations.

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## Syllabus for CUET (UG) - Chemistry

### Unit I: Solid State

Classification of solids based on different binding forces: molecular, ionic covalent, and metallic solids, amorphous and crystalline solids (elementary idea), unit cell in two-dimensional and three-dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties, Band theory of metals, conductors, semiconductors and insulators and  $n$  and  $p$ -type semiconductors.

### Unit II: Solutions

Types of solutions, expression of concentration of solutions of solids in liquids, the solubility of gases in liquids, solid solutions, colligative properties – the relative lowering of vapour pressure, Raoult's law, elevation of B.P., depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Van't Hoff factor.

### Unit III: Electrochemistry

Redox reactions; Conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells, Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion.

### Unit IV: Chemical Kinetics

Rate of a reaction (average and instantaneous), factors affecting rates of reaction: concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations, and half-life (only for zero and first-order reactions); concept of collision theory (elementary idea, no mathematical treatment), Activation energy, Arrhenius equation.

### Unit V: Surface Chemistry

*Adsorption* – Physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis: homogeneous and heterogeneous, activity and selectivity; enzyme catalysis; colloidal state: the distinction between true solutions, colloids, and suspensions; lyophilic, lyophobic; multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsions – types of emulsions.

### Unit VI: General Principles and Processes of Isolation of Elements

*Principles and methods of extraction* – Concentration, oxidation, reduction, electrolytic method, and refining; occurrence and principles of extraction of aluminum, copper, zinc, and iron.

### Unit VII: $p$ -Block Elements

**Group 15 elements:** General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen – preparation, properties, and uses; compounds of nitrogen: preparation and properties of ammonia and nitric acid, oxides of nitrogen (structure only); Phosphorus-allotropic forms; compounds of phosphorus: preparation and properties of phosphine, halides ( $\text{PCl}_3$ ,  $\text{PCl}_5$ ) and oxoacids (elementary idea only).

**Group 16 elements:** General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; dioxygen: preparation, properties, and uses; classification of oxides; ozone. Sulphur – allotropic forms; compounds of sulphur: preparation, properties, and uses of sulphur dioxide; sulphuric acid: industrial process of manufacture, properties and uses, oxoacids of sulphur (structures only).

**Group 17 elements:** General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens: preparation, properties and uses of chlorine and hydrochloric acid, interhalogen compounds, oxoacids of halogens (structures only).

**Group 18 elements:** General introduction, electronic configuration, occurrence, trends in physical and chemical properties, uses.

### **Unit VIII: *d* and *f* Block Elements**

General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first-row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation. Preparation and properties of  $K_2Cr_2O_7$  and  $KMnO_4$ .

**Lanthanoids:** Electronic configuration, oxidation states, chemical reactivity, and lanthanoid contraction and its consequences.

**Actinoids:** Electronic configuration, oxidation states, and comparison with lanthanoids.

### **Unit IX Coordination Compounds**

**Coordination compounds:** Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds, bonding, Werner's theory, VBT, CFT, isomerism (structural and stereo), importance of coordination compounds (in qualitative analysis, extraction of metals and biological systems)

### **Unit X: Haloalkanes and Haloarenes**

**Haloalkanes:** Nomenclature, nature of C–X bond, physical and chemical properties, mechanism of substitution reactions. Optical rotation

**Haloarenes:** Nature of C–X bond, substitution reactions (directive influence of halogen for monosubstituted compounds only)

Uses and environmental effects of: dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT

### **Unit XI: Alcohols, Phenols, and Ethers**

**Alcohols:** Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only), identification of primary, secondary, and tertiary alcohols, mechanism of dehydration, uses with special reference to methanol and ethanol

**Phenols:** Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols

**Ethers:** Nomenclature, methods of preparation, physical and chemical properties, uses

### **Unit XII: Aldehydes, Ketones, and Carboxylic Acids**

**Aldehydes and Ketones:** Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, mechanism of nucleophilic addition, the reactivity of alpha hydrogen in aldehydes, uses

**Carboxylic Acids:** Nomenclature, acidic nature, methods of preparation, physical and chemical properties, uses

### **Unit XIII: Organic Compounds Containing Nitrogen**

**Amines:** Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary secondary, and tertiary amines

*Cyanides and Isocyanides*

**Diazonium salts:** Preparation, chemical reactions and importance in synthetic organic chemistry

#### **Unit XIV: Biomolecules**

**Carbohydrates:** Classification (aldoses and ketoses), monosaccharide (glucose and fructose), D-L configurations, oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen), importance

**Proteins:** Elementary idea of  $\alpha$ -amino acids, peptide bond, polypeptides, proteins, primary structure, secondary structure, tertiary structure and quaternary structure (qualitative idea only), denaturation of proteins, enzymes

**Hormones:** Elementary idea (excluding structure)

**Vitamins:** Classification and functions

**Nucleic Acids:** DNA and RNA

#### **Unit XV: Polymers**

**Classification:** Natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers, natural and synthetic like polythene, nylon, polyesters, bakelite, rubber, biodegradable and non-biodegradable polymers

#### **Unit XVI: Chemistry in Everyday Life**

**Chemicals in medicines:** Analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.

**Chemicals in food:** Preservatives, artificial sweetening agents, elementary idea of antioxidants

**Cleansing agents:** Soaps and detergents, cleansing action

## Broad features of CUET (UG)

Mode of Examination: Computer Based Test (CBT) mode						
Sections	Subjects/ Tests	Questions to be Attempted	Marks per Question	Total Marks	Question Type	Duration
<b>Section IA - Languages</b>	There are 13 different languages. Any of these languages may be chosen.	40 questions out of 50 in each language	5	200	<ul style="list-style-type: none"> <li>Language to be tested through Reading Comprehension based on different types of passages–Factual, Literary and Narrative, [Literary Aptitude and Vocabulary]</li> <li>MCQ Based Questions</li> </ul>	45 Minutes for each language
<b>Section IB - Languages</b>	There are 20 Languages. Any other language apart from those offered in Section I A may be chosen.					
<b>Section II - Domain</b>	There are 27 Domains specific Subjects being offered under this Section. A candidate may choose a maximum of Six Domains as desired by the applicable University/ Universities.	40 questions out of 50 in each subject	5	200	<ul style="list-style-type: none"> <li>Input text can be used for MCQ Based Questions</li> <li>MCQs based on syllabus given on NTA website</li> </ul>	45 Minutes for each Domain Specific Subjects
<b>Section III General Test</b>	For any such undergraduate programme/ programmes being offered by Universities where a General Test is being used for admission.	60 questions out of 75	5	300	<ul style="list-style-type: none"> <li>Input text can be used for MCQ Based Questions</li> <li>General Knowledge, Current Affairs, General Mental Ability, Numerical Ability, Quantitative Reasoning (Simple application of basic mathematical arithmetic/algebra geometry/mensuration /stat taught till Grade 8), Logical and Analytical Reasoning</li> </ul>	60 Minutes
<b>Note:</b> <ul style="list-style-type: none"> <li>One mark will be deducted for a wrong answer.</li> <li>Unanswered/Marked for Review will be given no mark (0).</li> </ul>						

Candidates are advised to visit the NTA CUET (UG) official website <https://cuet.samarth.ac.in/> for the latest updates regarding the Examination.

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Time: 45 minutes

Total Marks: 200

**Instructions:**

- Attempt any 40 out of the given 50 questions.
- Each question carries 5 marks.
- No mark will be given to unanswered/marked for review questions.
- Negative marking of 1 mark for a wrong answer.

1. Which one of the following is NOT a property of physical adsorption?  
 (A) Higher the pressure, more the adsorption  
 (B) Lower the temperature, more the adsorption  
 (C) Greater the surface area, more the adsorption  
 (D) Unilayer adsorption occurs
2. In the electrochemical cell,  
 $\text{Pt} | \text{H}_2(\text{g}, 1 \text{ atm}) | \text{H}^+(1\text{M}) || \text{Cu}^{2+}(1\text{M}) | \text{Cu}(\text{s})$   
 Which one of the following statements is TRUE?  
 (A)  $\text{H}_2$  is cathode; Cu is anode  
 (B) Oxidation occurs at Cu electrode  
 (C) Reduction occurs at  $\text{H}_2$  electrode  
 (D)  $\text{H}_2$  is anode; Cu is cathode
3. Vapour pressure of  $\text{CCl}_4$  at  $25^\circ\text{C}$  is 143 mm of Hg. 0.5 g of a non-volatile solute (molecular mass = 65) is dissolved in 100 mL  $\text{CCl}_4$ . Find the vapour pressure of the solution. (Density of  $\text{CCl}_4$  is  $1.58 \text{ g cm}^{-3}$ )  
 (A) 141.93 mm Hg  
 (B) 194.39 mm Hg  
 (C) 199.34 mm Hg  
 (D) 143.99 mm Hg
4. For oxoacids having the same oxidation number of the halogen atoms, the order of acid strength is \_\_\_\_\_.  
 (A)  $\text{HClO} < \text{HBrO} < \text{HIO}$   
 (B)  $\text{HClO} > \text{HBrO} > \text{HIO}$   
 (C)  $\text{HClO} < \text{HBrO} > \text{HIO}$   
 (D)  $\text{HIO} > \text{HClO} > \text{HBrO}$
5. Among the properties:  
 I. Reducing                      II. Oxidising  
 III. Complexing                IV. Chelating  
 The set of properties shown by  $\text{CN}^-$  ion towards metal species is \_\_\_\_\_.  
 (A) I, III                              (B) II, III  
 (C) I, II, IV                        (D) I, II, III
6. Which of the following compounds will give racemic mixture on nucleophilic substitution by  $\text{OH}^-$  ion?  
 I.  $\text{CH}_3 - \underset{\text{C}_2\text{H}_5}{\text{CH}} - \text{Br}$     II.  $\text{CH}_3 - \underset{\text{C}_2\text{H}_5}{\overset{\text{Br}}{\text{C}}} - \text{CH}_3$
- III.  $\text{CH}_3 - \underset{\text{C}_2\text{H}_5}{\text{CH}} - \text{CH}_2\text{Br}$   
 (A) I only                              (B) I, II, III  
 (C) II, III                              (D) I, III
7.  $\text{CH}_2 = \text{CH}_2 + \text{B}_2\text{H}_6 \xrightarrow[\text{H}_2\text{O}_2]{\text{NaOH}}$  Product  
 Product in the above reaction is \_\_\_\_\_.  
 (A)  $\text{CH}_3\text{CH}_2\text{CHO}$                 (B)  $\text{CH}_3\text{CH}_2\text{OH}$   
 (C)  $\text{CH}_3\text{CHO}$                         (D)  $\text{CH}_3\text{COCH}_3$
8. Identify the product of the following reaction.  
 $\text{Starch} + n\text{H}_2\text{O} \xrightarrow[393\text{K}, 2-3\text{atm}]{\text{H}^+} ?$   
 (A) Fructose                        (B) Glucose  
 (C) Lactose                         (D) Maltose
9. Which of the following is NOT a tranquilizer?  
 (A) Amytal                            (B) Seconal  
 (C) Equanil                         (D) Tegamet
10. Fructose contains \_\_\_\_\_.  
 I. 3 primary  $-\text{OH}$  groups  
 II. 3 secondary alcoholic groups  
 III. 2 primary alcoholic groups and one keto group  
 (A) I and II                            (B) II and III  
 (C) I and III                         (D) III only
11. A primary alkyl halide would prefer to undergo \_\_\_\_\_.  
 (A)  $\text{S}_{\text{N}}1$  reaction  
 (B)  $\text{S}_{\text{N}}2$  reaction  
 (C)  $\alpha$ -elimination  
 (D) racemisation
12. **Assertion:** Among hydrides of group 16 elements, water is least acidic.  
**Reason:** Boiling point of water is high.  
 (A) Assertion and Reason are true. Reason is correct explanation of Assertion.  
 (B) Assertion and Reason are true. Reason is not the correct explanation of Assertion.  
 (C) Assertion is true, Reason is false.  
 (D) Assertion is false, Reason is true.
13. Which of the following is NOT concentrated by froth floatation process?  
 (A) Argentite  
 (B) Galena  
 (C) Copper pyrites  
 (D) Bauxite



14. Which of the following statements is CORRECT?  
 (A) The rate of a reaction decreases with passage of time as the concentration of reactants decreases.  
 (B) The rate of a reaction is same at any time during the reaction.  
 (C) The rate of a reaction is independent of temperature change.  
 (D) The rate of a reaction decreases with increase in concentration of reactant(s).
15. Indicate the complex ion which shows geometrical isomerism.  
 (A)  $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]^+$  (B)  $[\text{Pt}(\text{NH}_3)_3\text{Cl}]$   
 (C)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  (D)  $[\text{Co}(\text{CN})_5(\text{NC})]^{3-}$
16. The number of structural isomers possible from the molecular formula  $\text{C}_3\text{H}_9\text{N}$  is \_\_\_\_\_.  
 (A) 2 (B) 3 (C) 4 (D) 5
17. Which of the following is a copolymer?  
 (A) Buna-S (B) Terylene  
 (C) PVC (D) Polypropylene
18. Match the following.

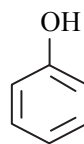
	List - I		List - II
i.	$\text{CH}_3 - \text{CHBr} - \text{CH}_2\text{Br} \xrightarrow{\text{KOH}/\text{C}_2\text{H}_5\text{OH}}$	a.	1°-Alkyl bromide
ii.	$\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CH}_2 \xrightarrow[\text{(C}_6\text{H}_5\text{CO)}_2\text{O}_2, \Delta]{\text{HBr}}$	b.	2°-Alkyl bromide
iii.	$\text{CH}_3\text{CH}_2\text{CH}_3 \xrightarrow{\text{Br}_2, \text{h}\nu}$	c.	Allyl bromide
iv.	$\text{CH}_3 - \text{CH} = \text{CH}_2 \xrightarrow[\Delta]{\text{NBS}}$	d.	Vinyl bromide

The CORRECT answer is \_\_\_\_\_.

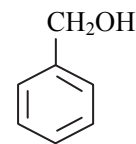
- (A) i - a, ii - d, iii - b, iv - c  
 (B) i - d, ii - c, iii - a, iv - b  
 (C) i - b, ii - c, iii - a, iv - d  
 (D) i - d, ii - a, iii - b, iv - c
19. In which among the oxides of nitrogen is the oxidation number of nitrogen lowest?  
 (A) Nitric oxide (B) Nitrous oxide  
 (C) Nitrogen dioxide (D) Nitrogen trioxide
20. Photographic plates are formed by coating thin glass plates or celluloid films with gelatine containing a fine suspension of \_\_\_\_\_.  
 (A) silver nitrate (B) silver chromate  
 (C) silver bromide (D) silver iodide
21. The sharp melting point of crystalline solids is due to \_\_\_\_\_.  
 (A) a regular arrangement of constituent particles observed over a short distance in the crystal lattice  
 (B) a regular arrangement of constituent particles observed over a long distance in the crystal lattice

- (C) same arrangement of constituent particles in different directions  
 (D) different arrangement of constituent particles in different directions
22. Graphite is a good conductor of electricity due to the presence of \_\_\_\_\_.  
 (A) lone pair of electrons  
 (B) free valence electrons  
 (C) cations  
 (D) anions
23. The solution of this compound will show maximum ionic conductivity:  
 (A)  $\text{K}_4[\text{Fe}(\text{CN})_6]$   
 (B)  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$   
 (C)  $[\text{Cu}(\text{NH}_3)_4]\text{Cl}_2$   
 (D)  $[\text{Ni}(\text{CO})_4]$
24. Reactivity order of halides for dehydrohalogenation is \_\_\_\_\_.  
 (A)  $\text{R} - \text{F} > \text{R} - \text{Cl} > \text{R} - \text{Br} > \text{R} - \text{I}$   
 (B)  $\text{R} - \text{I} > \text{R} - \text{Br} > \text{R} - \text{Cl} > \text{R} - \text{F}$   
 (C)  $\text{R} - \text{I} > \text{R} - \text{Cl} > \text{R} - \text{Br} > \text{R} - \text{F}$   
 (D)  $\text{R} - \text{F} > \text{R} - \text{I} > \text{R} - \text{Br} > \text{R} - \text{Cl}$

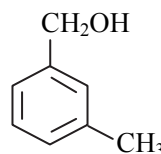
25. Which of the following compounds is(are) aromatic alcohol(s)?



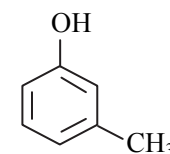
(I)



(II)



(III)



(IV)

- (A) II, III (B) I, IV  
 (C) I, III (D) I, II, III, IV
26. The IUPAC name of picric acid is \_\_\_\_\_.  
 (A) 2-methylphenol  
 (B) 2,4,6-trinitrophenol  
 (C) benzene-1,2,4-triol  
 (D) 4-hydroxybenzoic acid
27. The major organic product in the reaction of  $\text{H}_2\text{NCOCH}_2\text{CH}_2\text{CONH}_2$  by  $\text{LiAlH}_4$  is \_\_\_\_\_.  
 (A)  $\text{H}_2\text{NCO}(\text{CH}_2)_3\text{NH}_2$   
 (B)  $\text{BrNH}-\text{CO}-(\text{CH}_2)_3-\text{CO}-\text{NH}_2$   
 (C)  $\text{BrNH}-\text{CO}-(\text{CH}_2)_3-\text{CO}-\text{NHBBr}$   
 (D)  $\text{H}_2\text{N}(\text{CH}_2)_4\text{NH}_2$



28. Match the following:

	Column I		Column II
i.		a.	Amylose
ii.		b.	Amylopectin
iii.		c.	Glycogen
iv.		d.	Cellulose

- (A) i – b, ii – d, iii – a, iv – c  
 (B) i – a, ii – d, iii – c, iv – b  
 (C) i – d, ii – c, iii – a, iv – b  
 (D) i – d, ii – b, iii – a, iv – c

29. In group 15 elements, \_\_\_\_\_ shows maximum tendency for catenation.  
 (A) phosphorus (B) arsenic  
 (C) antimony (D) bismuth
30. Consider the following standard electrode potentials ( $E^\circ$  in volts) in aqueous solution:

Element	$M^{3+}/M$	$M^+/M$
Al	-1.66	+0.55
Tl	+1.26	-0.34

Based on these data, which of the following statements is CORRECT?

- (A)  $Tl^+$  is more stable than  $Al^{3+}$   
 (B)  $Al^+$  is more stable than  $Al^{3+}$   
 (C)  $Tl^+$  is more stable than  $Al^+$   
 (D)  $Tl^{3+}$  is more stable than  $Al^{3+}$
31. In a close packed lattice containing N-particles, the number of tetrahedral and octahedral voids are \_\_\_\_\_ respectively.  
 (A) N, 2N (B) N, N  
 (C) 2N, N (D) 2N, N/2

32. In  $[Ni(CO)_4]$  and  $[NiCl_4]^{2-}$  species, the hybridization states of the Ni atom are respectively \_\_\_\_\_ . (At. no. of Ni = 28)

- (A)  $sp^3, dsp^2$  (B)  $dsp^2, sp^3$   
 (C)  $dsp^2, dsp^2$  (D)  $sp^3, sp^3$

33. Based on the following information, the increasing order of basicity of the given amines is \_\_\_\_\_ .

Amines	$pK_b$ values in aqueous phase
Ammonia	4.75
Benzenamine	9.38
N-Methylmethanamine	3.27
Methanamine	3.38

- (A)  $CH_3-NH-CH_3 < CH_3NH_2 < NH_3 < C_6H_5NH_2$   
 (B)  $C_6H_5NH_2 < NH_3 < CH_3-NH-CH_3 < CH_3NH_2$   
 (C)  $C_6H_5NH_2 < NH_3 < CH_3NH_2 < CH_3-NH-CH_3$   
 (D)  $CH_3-NH-CH_3 < CH_3NH_2 < C_6H_5NH < NH_3$

34. (I) Natural rubber is an example of plant polymer.  
 (II) Cellulose acetate rayon is an example of synthetic polymer.  
 (III) Wool is an example of animal polymer.  
 (IV) Neoprene is an example of semisynthetic polymer.

The above statements are CORRECT, EXCEPT:

- (A) I and IV (B) II and III  
 (C) I and III (D) II and IV

35. The limiting molar conductivities  $\wedge_m^\circ$  for NaCl, KBr and KCl are 126, 152 and 150  $S\text{ cm}^2\text{ mol}^{-1}$ , respectively. The  $\wedge_m^\circ$  for NaBr is \_\_\_\_\_ .

- (A) 278  $S\text{ cm}^2\text{ mol}^{-1}$   
 (B) 176  $S\text{ cm}^2\text{ mol}^{-1}$   
 (C) 128  $S\text{ cm}^2\text{ mol}^{-1}$   
 (D) 302  $S\text{ cm}^2\text{ mol}^{-1}$

36. Which of the following metal sol CANNOT be prepared by Bredig's arc method?

- (A) Na (B) Cu  
 (C) Au (D) Pt

37. The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is \_\_\_\_\_ .

$[K_f \text{ of benzene} = 5.12\text{ K kg mol}^{-1}]$

- (A) 0.80 K (B) 0.40 K  
 (C) 0.60 K (D) 0.20 K



38. If rate =  $k[\text{NO}]^2[\text{O}_2]$ , rate constant may be increased by \_\_\_\_\_.
- (A) increasing temperature  
(B) decreasing temperature  
(C) increasing concentration of  $\text{O}_2$   
(D) increasing concentration of  $\text{NO}$
39. For a chemical reaction,  $2\text{A} + \text{B} \longrightarrow \text{C} + \text{D}$ , the INCORRECT statement is \_\_\_\_\_.
- (A) Rate of disappearance of  $\text{B} =$  Rate of appearance of  $\text{C} =$  rate of appearance of  $\text{D}$   
(B) Half the rate of disappearance of  $\text{A} =$  rate of appearance of  $\text{C}$  or  $\text{D}$   
(C) Twice the rate of disappearance of  $\text{A} =$  rate of disappearance of  $\text{B}$   
(D) Half the rate of disappearance of  $\text{A} =$  rate of disappearance of  $\text{B}$
40. Match the items given in Column I with the type of solutions given in Column II.

	Column I		Column II
i.	German silver	a.	A solution of gas in liquid
ii.	Hydrogen gas in palladium	b.	A solution of gas in gas
iii.	Soda water	c.	A solution of solid in solid
iv.	Air	d.	A solution of gas in solid

- (A) i - c, ii - a, iii - b, iv - d  
(B) i - d, ii - b, iii - c, iv - a  
(C) i - a, ii - d, iii - b, iv - c  
(D) i - c, ii - d, iii - a, iv - b

**Read the following passage and answer the questions from 41 to 45.**

The transition elements are placed in the periods 4 to 7 and groups 3 to 12 of the modern periodic table. They constitute 3d, 4d, 5d and 6d series.

All transition elements are metals and show properties that are characteristic of metals. They are hard, lustrous, malleable, ductile and form alloys with other metals. The involvement of  $(n-1)d$  electrons in the behaviour of transition elements impart certain distinct characteristics to these elements. Thus, in addition to multiple oxidation states, they also exhibit magnetic behaviour, catalytic properties and tendency for the formation of coloured ions, interstitial compounds and complexes.

Many of the transition metal ions are paramagnetic. Paramagnetism arises from the presence of unpaired electrons. For the compounds of the first series of transition metals, the contribution of the orbital angular momentum is effectively quenched and hence is of no significance. For these, the magnetic moment is determined by the number of unpaired d-electrons.

The transition metals and their compounds are known for their catalytic activity. This activity is ascribed to their ability to adopt multiple oxidation states and to form complexes.  $\text{V}_2\text{O}_5$  (in Contact Process), finely divided iron (in Haber's Process), and nickel (in Catalytic Hydrogenation) are some of the examples.

41. Which of the following ions will give colourless aqueous solution?
- (A)  $\text{Ti}^{3+}$  (B)  $\text{Cu}^{2+}$   
(C)  $\text{Ti}^{4+}$  (D)  $\text{Ni}^{2+}$
42. The magnetic nature of elements depends on the presence of unpaired electrons. Identify the configuration of transition element, which shows the highest magnetic moment.
- (A)  $3d^7$  (B)  $3d^5$   
(C)  $3d^8$  (D)  $3d^2$
43. The spin only magnetic moment of transition metal ion having  $3d^3$  electronic configuration is \_\_\_\_\_ BM.
- (A)  $\sqrt{15}$  (B)  $\sqrt{24}$  (C)  $\sqrt{35}$  (D)  $\sqrt{8}$
44. Which of the following ions is NOT paramagnetic?
- (A)  $\text{Mn}^{2+}$  (B)  $\text{V}^{3+}$   
(C)  $\text{Ni}^{2+}$  (D)  $\text{Sc}^{3+}$
45. An oxide of transition metal 'X' is used as a catalyst in contact process. What is the oxidation state of the transition metal 'X' in this compound?
- (A) +2 (B) +3  
(C) +5 (D) +6

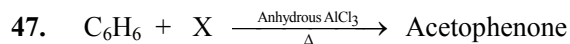
**Read the following passage and answer the questions from 46 to 50.**

Aldehydes and ketones are the simplest and the most important carbonyl compounds. They find wide applications in industry as well as in day-to-day life. Various methods are used for the preparation of aldehydes and ketones from different classes of organic compounds. They also undergo a number of chemical reactions.

Consider the following series of reactions involving aldehydes and ketones.

Toluene undergoes Etard reaction to form compound [A]. Benzene reacts with reagent [X] in presence of anhydrous  $\text{AlCl}_3$  to form acetophenone. Compound [A] and acetophenone undergo cross aldol condensation to form product [B]. Compound [A] on reaction with conc.  $\text{NaOH}$  forms compound [C],  $\text{C}_7\text{H}_8\text{O}$  and compound [D],  $\text{C}_7\text{H}_5\text{NaO}_2$ .

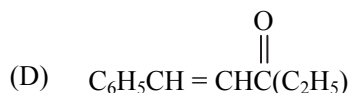
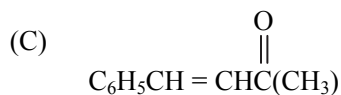
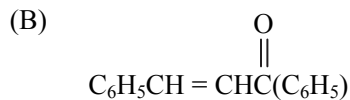
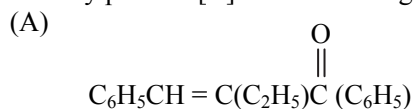
46. Functional group present in compound [A] is \_\_\_\_\_.
- (A)  $-\text{OH}$  (B)  $-\text{COOH}$   
(C)  $-\text{O}-$  (D)  $-\text{CHO}$



Identify the reagent X.

- (A) Ethanoyl chloride
- (B) Propionyl chloride
- (C) Benzoyl chloride
- (D) Methyl chloride

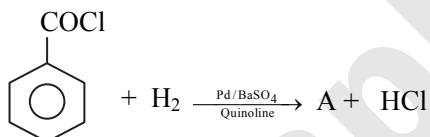
48. Identify product [B] from following.



49. Reaction of compound [A] with conc. NaOH to give compound [C],  $C_7H_8O$  and compound [D],  $C_7H_5NaO_2$  can be called as \_\_\_\_\_.

- (A) Cannizzaro reaction
- (B) Etard reaction
- (C) Gatterman-Koch formylation reaction
- (D) Hell-Volhard-Zelinsky reaction

50. Following reaction can also be used in the preparation of compound [A].



This reaction is known as \_\_\_\_\_.

- (A) Rosenmund reduction
- (B) Stephen reaction
- (C) Cannizzaro reaction
- (D) Friedel-Crafts reaction

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To see complete chapter buy **Target Notes** or **Target E-Notes**

<b>Practice Paper – 01</b>	1. (D) 2. (D) 3. (A) 4. (B) 5. (A) 6. (A) 7. (B) 8. (B) 9. (D) 10. (B)
	11. (B) 12. (B) 13. (D) 14. (A) 15. (A) 16. (C) 17. (A) 18. (D) 19. (B) 20. (C)
	21. (B) 22. (B) 23. (A) 24. (B) 25. (A) 26. (B) 27. (D) 28. (D) 29. (A) 30. (C)
	31. (C) 32. (D) 33. (C) 34. (D) 35. (C) 36. (A) 37. (B) 38. (A) 39. (C) 40. (D)
	41. (C) 42. (B) 43. (A) 44. (D) 45. (C) 46. (D) 47. (A) 48. (B) 49. (A) 50. (A)

<b>Practice Paper – 02</b>	1. (B) 2. (A) 3. (C) 4. (A) 5. (C) 6. (C) 7. (B) 8. (B) 9. (A) 10. (D)
	11. (D) 12. (C) 13. (A) 14. (A) 15. (C) 16. (B) 17. (C) 18. (D) 19. (A) 20. (D)
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	31. (C) 32. (B) 33. (C) 34. (B) 35. (A) 36. (A) 37. (B) 38. (A) 39. (A) 40. (A)
	41. (C) 42. (A) 43. (B) 44. (A) 45. (A) 46. (C) 47. (D) 48. (B) 49. (A) 50. (D)

<b>Practice Paper – 03</b>	1. (D) 2. (D) 3. (C) 4. (B) 5. (B) 6. (D) 7. (D) 8. (C) 9. (D) 10. (A)
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	31. (D) 32. (C) 33. (A) 34. (A) 35. (D) 36. (B) 37. (C) 38. (A) 39. (B) 40. (B)
	41. (A) 42. (D) 43. (D) 44. (C) 45. (C) 46. (A) 47. (B) 48. (A) 49. (A) 50. (D)

<b>Practice Paper – 04</b>	1. (A) 2. (B) 3. (B) 4. (B) 5. (C) 6. (B) 7. (C) 8. (A) 9. (D) 10. (B)
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	31. (D) 32. (D) 33. (B) 34. (D) 35. (C) 36. (C) 37. (D) 38. (A) 39. (D) 40. (C)
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<b>Practice Paper – 05</b>	1. (D) 2. (D) 3. (D) 4. (B) 5. (C) 6. (D) 7. (C) 8. (B) 9. (C) 10. (C)
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<b>Practice Paper – 06</b>	1. (C) 2. (A) 3. (B) 4. (A) 5. (A) 6. (C) 7. (C) 8. (B) 9. (B) 10. (A)
	11. (C) 12. (A) 13. (D) 14. (D) 15. (D) 16. (A) 17. (A) 18. (B) 19. (B) 20. (B)
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	31. (D) 32. (C) 33. (A) 34. (D) 35. (C) 36. (C) 37. (A) 38. (A) 39. (B) 40. (D)
	41. (A) 42. (D) 43. (A) 44. (C) 45. (B) 46. (A) 47. (C) 48. (A) 49. (B) 50. (B)

<b>Practice Paper – 07</b>	1. (C) 2. (A) 3. (A) 4. (B) 5. (C) 6. (B) 7. (C) 8. (A) 9. (D) 10. (A)
	11. (C) 12. (A) 13. (B) 14. (C) 15. (D) 16. (C) 17. (D) 18. (A) 19. (D) 20. (D)
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	31. (D) 32. (B) 33. (A) 34. (B) 35. (B) 36. (A) 37. (A) 38. (C) 39. (D) 40. (B)
	41. (C) 42. (C) 43. (B) 44. (C) 45. (B) 46. (A) 47. (B) 48. (C) 49. (D) 50. (B)

<b>Practice Paper – 08</b>	1. (C) 2. (C) 3. (B) 4. (C) 5. (A) 6. (C) 7. (B) 8. (B) 9. (A) 10. (B)
	11. (C) 12. (B) 13. (B) 14. (C) 15. (A) 16. (C) 17. (B) 18. (C) 19. (A) 20. (D)
	21. (A) 22. (D) 23. (C) 24. (D) 25. (D) 26. (B) 27. (B) 28. (A) 29. (D) 30. (C)
	31. (A) 32. (A) 33. (B) 34. (B) 35. (C) 36. (C) 37. (D) 38. (A) 39. (A) 40. (D)
	41. (C) 42. (B) 43. (D) 44. (D) 45. (C) 46. (A) 47. (B) 48. (B) 49. (A) 50. (B)





<b>Practice Paper – 09</b>	1. (A) 2. (C) 3. (A) 4. (B) 5. (A) 6. (A) 7. (C) 8. (B) 9. (B) 10. (D)
	11. (B) 12. (B) 13. (B) 14. (C) 15. (C) 16. (D) 17. (B) 18. (B) 19. (A) 20. (A)
	21. (A) 22. (B) 23. (B) 24. (C) 25. (D) 26. (A) 27. (D) 28. (C) 29. (B) 30. (B)
	31. (B) 32. (B) 33. (B) 34. (A) 35. (B) 36. (A) 37. (C) 38. (B) 39. (B) 40. (A)
	41. (D) 42. (B) 43. (B) 44. (C) 45. (D) 46. (B) 47. (D) 48. (A) 49. (D) 50. (B)

<b>Practice Paper – 10</b>	1. (D) 2. (D) 3. (D) 4. (A) 5. (D) 6. (A) 7. (C) 8. (A) 9. (D) 10. (D)
	11. (B) 12. (B) 13. (C) 14. (C) 15. (B) 16. (D) 17. (A) 18. (C) 19. (A) 20. (B)
	21. (D) 22. (D) 23. (C) 24. (A) 25. (C) 26. (A) 27. (C) 28. (A) 29. (C) 30. (C)
	31. (C) 32. (C) 33. (A) 34. (C) 35. (A) 36. (C) 37. (D) 38. (B) 39. (A) 40. (D)
	41. (C) 42. (C) 43. (D) 44. (C) 45. (B) 46. (A) 47. (A) 48. (C) 49. (C) 50. (B)

Practice Paper – 1

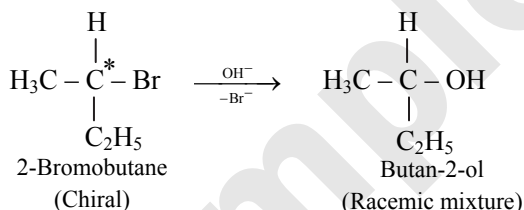
- (D)  
In physical adsorption, multilayers of adsorption occur under high pressure.
- (D)  
H<sub>2</sub> is anode at which oxidation takes place, while Cu is cathode at which reduction takes place.

3. (A)

Smart Key - 3

The vapour pressure of pure CCl<sub>4</sub> is 143 mm of Hg at 25 °C. When a non-volatile solute is added, the vapour pressure is lowered. Thus, the vapour pressure of solution is less than 143 mm Hg. Only option (A) has value (141.93 mm Hg) less than 143 mm Hg. Hence, option (A) is the correct answer.

- (B)
- (A)  
CN<sup>-</sup> ions act both as reducing agent as well as good complexing agent.
- (A)  
In compound (I), Br is directly attached to chiral carbon atom. Therefore, it will give a racemic mixture on nucleophilic substitution by OH<sup>-</sup> ion (S<sub>N</sub>1).

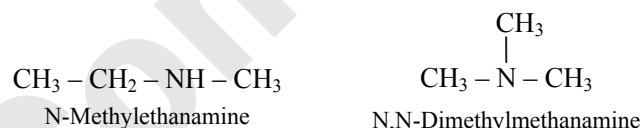
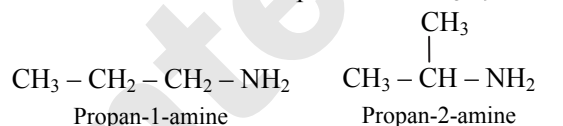


- (B)  

$$\begin{array}{ccc}
 6\text{CH}_2 = \text{CH}_2 + \text{B}_2\text{H}_6 & \longrightarrow & 2(\text{CH}_3 - \text{CH}_2)_3\text{B} \\
 \text{Ethene} & & \text{Triethylborane} \\
 & & \downarrow \text{H}_2\text{O}_2 / \text{OH}^- \\
 & & \text{CH}_3 - \text{CH}_2 - \text{OH} + \text{B}(\text{OH})_3 \\
 & & \text{Ethanol}
 \end{array}$$
- (B)  
Hydrolysis of starch by boiling with dilute sulphuric acid at 393 K, under pressure results in the formation of glucose.  

$$(\text{C}_6\text{H}_{10}\text{O}_5)_n + n\text{H}_2\text{O} \xrightarrow[393 \text{ K, } 2-3 \text{ atm}]{\text{H}^+} n\text{C}_6\text{H}_{12}\text{O}_6$$
 Starch or cellulose
- (D)  
Tegamet is an antacid.

- (B)
- (B)  
In the hydrides of group 16 elements, the increasing order of acidic strength is: H<sub>2</sub>O < H<sub>2</sub>S < H<sub>2</sub>Se < H<sub>2</sub>Te. On moving down the group, M–H bond dissociation enthalpy decreases and the acidic character increases.
- (D)
- (A)
- (A)  
Complex [Cr(H<sub>2</sub>O)<sub>4</sub>Cl<sub>2</sub>]<sup>+</sup> is of [Ma<sub>4</sub>b<sub>2</sub>]<sup>n+</sup> type and hence shows cis-trans geometrical isomerism.
- (C)  
Four isomeric amines are possible for C<sub>3</sub>H<sub>9</sub>N.



- (A)  
Buna-S is an example of copolymer whereas acrilan, PVC and polypropylene are examples of addition polymers.
- (D)
- (C)
- (B)
- (B)
- (A)  
The given compounds will ionize as follows:  

$$\text{K}_4[\text{Fe}(\text{CN})_6] \rightleftharpoons 4\text{K}^+ + [\text{Fe}(\text{CN})_6]^{4-}$$

$$[\text{Co}(\text{NH}_3)_6]\text{Cl}_3 \rightleftharpoons [\text{Co}(\text{NH}_3)_6]^{3+} + 3\text{Cl}^-$$

$$[\text{Cu}(\text{NH}_3)_4]\text{Cl}_2 \rightleftharpoons [\text{Cu}(\text{NH}_3)_4]^{2+} + 2\text{Cl}^-$$

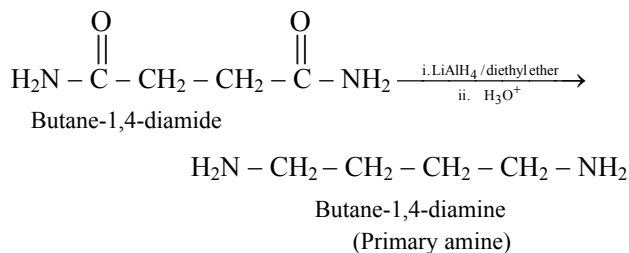
$$[\text{Ni}(\text{CO})_4] \longrightarrow \text{No ions}$$
 Since, K<sub>4</sub>[Fe(CN)<sub>6</sub>] gives maximum number of ions (i.e., 5 ions per molecule) in the solution, it will show maximum ionic conductivity among the given compounds.
- (B)
- (A)  
In aromatic alcohols, –OH group is not directly bonded to the benzene ring.
- (B)

Smart Key - 26

Picric acid is a nitrophenol and not a carboxylic acid. It is 2,4,6-trinitrophenol.



27. (D)



28. (D)

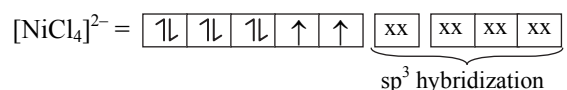
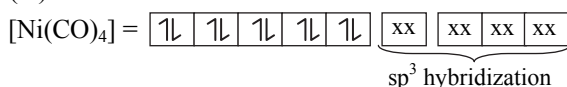
29. (A)

30. (C)

$\text{Ti}^+$  has negative electrode potential while  $\text{Al}^+$  has positive electrode potential. Hence,  $\text{Al}^+$  has tendency to be reduced to Al. Hence,  $\text{Ti}^+$  is more stable than  $\text{Al}^+$ .

31. (C)

32. (D)



33. (C)

$$\text{p}K_b \text{ value} \propto \frac{1}{\text{basicity of amines or ammonia}}$$

Thus, lower the  $\text{p}K_b$  value of an amine, stronger is the base. The increasing order of basicity of given compounds is Benzenamine < Ammonia < Methanamine < N-Methylmethanamine

34. (D)

35. (C)

$$(126 \text{ Scm}^2 \text{ mol}^{-1}) \wedge_{\text{m}(\text{NaCl})}^{\circ} = \lambda_{\text{Na}^+}^{\circ} + \lambda_{\text{Cl}^-}^{\circ} \quad \dots\text{(i)}$$

$$(152 \text{ Scm}^2 \text{ mol}^{-1}) \wedge_{\text{m}(\text{KBr})}^{\circ} = \lambda_{\text{K}^+}^{\circ} + \lambda_{\text{Br}^-}^{\circ} \quad \dots\text{(ii)}$$

$$(150 \text{ Scm}^2 \text{ mol}^{-1}) \wedge_{\text{m}(\text{KCl})}^{\circ} = \lambda_{\text{K}^+}^{\circ} + \lambda_{\text{Cl}^-}^{\circ} \quad \dots\text{(iii)}$$

By equation (i) + (ii) - (iii),

$$\wedge_{\text{m}(\text{NaBr})}^{\circ} = \lambda_{\text{Na}^+}^{\circ} + \lambda_{\text{Br}^-}^{\circ} = 126 + 152 - 150 = 128 \text{ S cm}^2 \text{ mol}^{-1}$$

36. (A)

Water is used in Bredig's arc method and sodium reacts violently with water.

37. (B)

$$\begin{aligned} \Delta T_f &= i K_f m \\ &= 1 \times 5.12 \times 0.078 \\ &= 0.40 \text{ K} \end{aligned}$$

38. (A)

The value of the rate constant  $k$  is independent of concentration of reactants. Hence, increasing the concentration of  $\text{NO}$  or  $\text{O}_2$  will not affect the rate constant  $k$ .

When the temperature of the reaction is increased, the rate of the reaction and the rate constant increases.

39. (C)

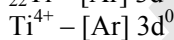
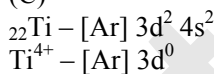
The given reaction is  $2\text{A} + \text{B} \longrightarrow \text{C} + \text{D}$ .

$$\begin{aligned} \text{Rate of the reaction} &= -\frac{1}{2} \frac{d[\text{A}]}{dt} = -\frac{d[\text{B}]}{dt} \\ &= \frac{d[\text{C}]}{dt} = \frac{d[\text{D}]}{dt} \end{aligned}$$

$\therefore$  Half the rate of disappearance of A  
= rate of disappearance of B  
= rate of appearance of C  
= rate of appearance of D

40. (D)

41. (C)



$\text{Ti}^{4+}$  ion will give colourless aqueous solution due to absence of unpaired electrons.

42. (B)

Configuration of transition elements	Number of unpaired electrons
$3d^2$	2
$3d^5$	5
$3d^7$	3
$3d^8$	2

$3d^5$  has 5 unpaired electrons; therefore, it shows the highest magnetic moment.

43. (A)

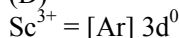


Here,  $n = 3$

Spin only magnetic moment ( $\mu$ ) =  $\sqrt{n(n+2)}$  BM

$$\mu = \sqrt{3(3+2)} = \sqrt{15} \text{ BM}$$

44. (D)



$\text{Sc}^{3+}$  attains electronic configuration of noble gas argon with all the electrons paired up in the orbitals. Hence, it is not paramagnetic.

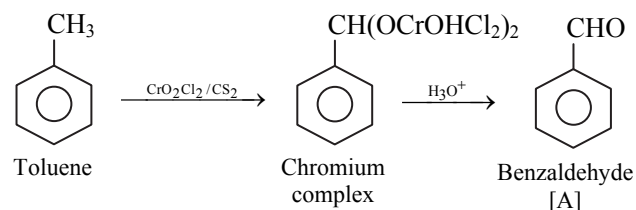
45. (C)

The catalyst used in contact process is  $\text{V}_2\text{O}_5$ .

Oxidation state of V in  $\text{V}_2\text{O}_5 = +5$

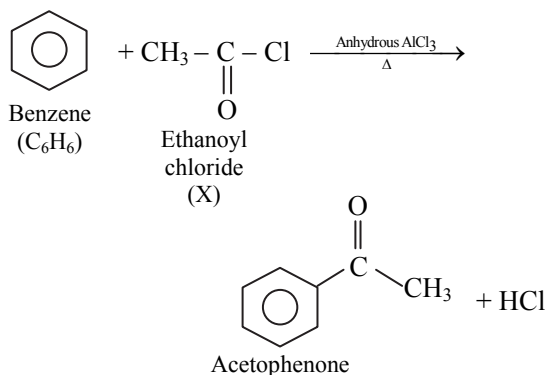
46. (D)

Etard reaction of toluene can be given as,

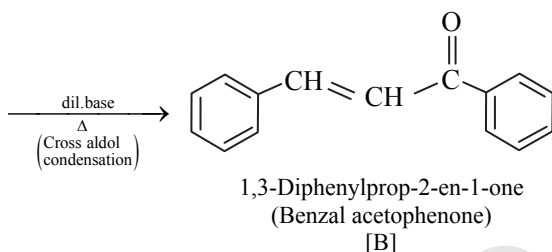
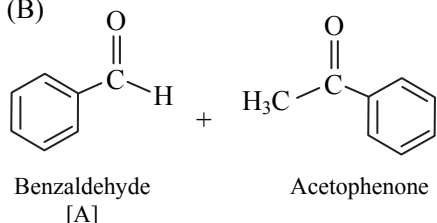




47. (A)

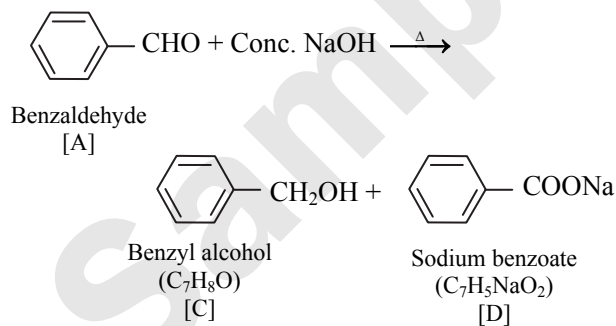


48. (B)



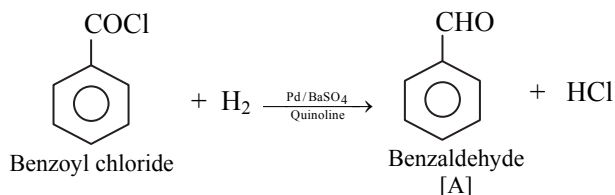
49. (A)

Aldehydes like benzaldehyde containing no  $\alpha$ -hydrogen atom undergo Cannizzaro reaction on heating with concentrated alkali.



50. (A)

Toluene undergoes Etard reaction to form compound [A] i.e., benzaldehyde. Compound [A] can also be prepared by Rosenmund reduction.



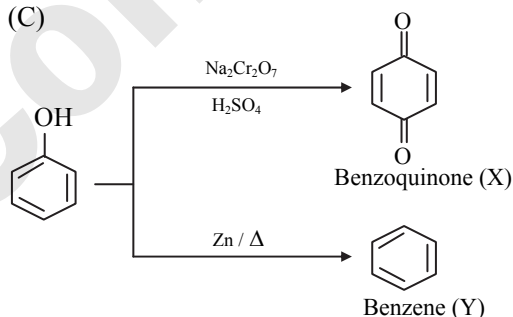
## Practice Paper – 2

- (B)  
The reaction is second order with respect to [CO].  
Hence the rate law with respect to [CO] is  
Rate =  $k[\text{CO}]^2$  .....(i)  
where, k is the proportionality constant.  
When [CO] is tripled,  
Rate' =  $k[3\text{CO}]^2$   
=  $9k[\text{CO}]^2$  .....(ii)  
Substituting (i) in the expression (ii),  
Rate' = 9 Rate
- (A)  
[Pt(NH<sub>3</sub>)<sub>2</sub>Cl<sub>2</sub>] is a neutral complex, since the coordination entity does not carry any charge.

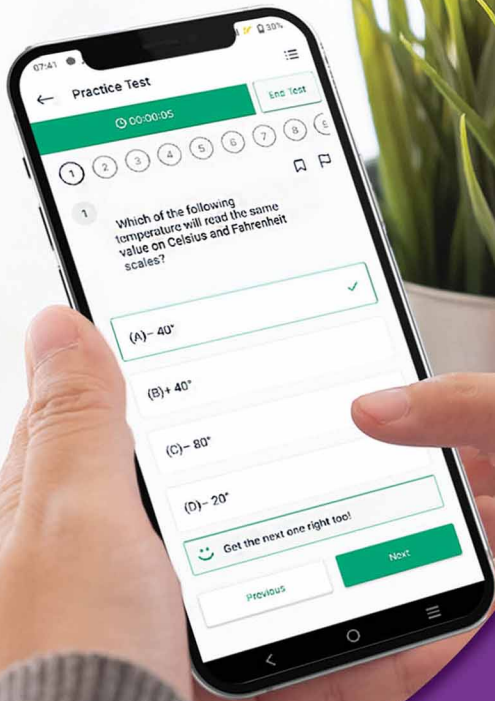
## Smart Key - 2

A neutral complex does not have any counter ion (either positive or negative). So, options (B), (C) and (D) can be eliminated.

3. (C)



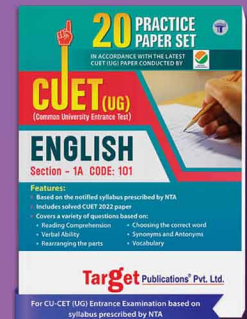
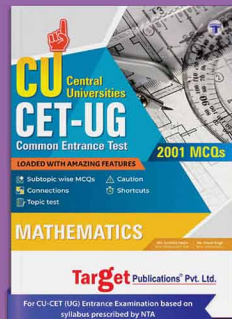
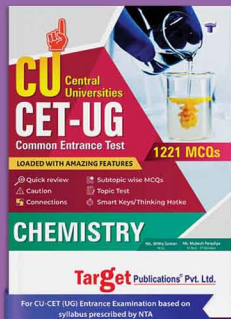
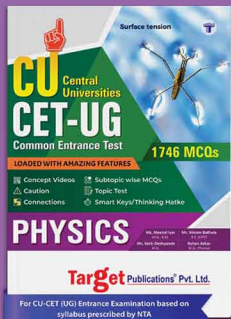
- (A)  
Terylene is formed by condensation polymerisation while nylon 6 is formed by ring opening polymerisation.
- (C)
- (C)
- (B)
- (B)  
Intermolecular interactions:  
A-A  $\equiv$  B-B  $\equiv$  A-B  $\Rightarrow$  will obey Raoult's law.  
Intermolecular interactions:  
A-A or B-B  $>$  A-B  $\Rightarrow$  positive deviation from Raoult's law.  
Intermolecular interactions:  
A-A or B-B  $<$  A-B  $\Rightarrow$  negative deviation from Raoult's law.  
 $\therefore$  (B) is the correct option.
- (A)  
Molar conductivity is the conductance of all the ions produced from 1 mole of the electrolyte. With dilution, the degree of ionization increases resulting in increase in the total number of ions and thus increase in the molar conductivity.



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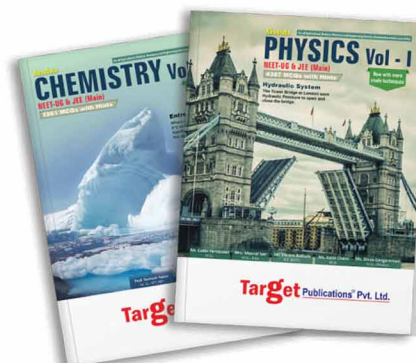
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