

Strictly based on the latest CBSE syllabus dated 4th April 2017 for Academic year 2017-18

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CHEMISTRY

CLASS 12

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CBSE CLASS 12

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KOZHIKODE PALARIVATTOM THRISSUR TRIVANDRUM	KARNATAKA Vasanta Book House, (080) 22216342 Maruti Book Centre, (080) 40124558 Prakash Sahitya (080) 22871030 Sri Sai Ram Book House, (080) 41472635 Sri Balaji Books & Stationers, (080) 22117659 Sapna Book House – (Gandhinagar, (080) 40114455), (Sadashivnagar, (080) 41236271), (Jayanagar, (080) 49066700), (Koramangala, (080) 40839999), (Residency Road, (080) 49166999), (Indiranagar, (080) 40459999), (Bannerghatta Road, (080) 42566299), (Nagavara, (080) 67294151), UBS Publisher & Dist., 9341621469, 22266681 Chaitanya Agency and Books, 8277477778 Laxmi Agencies, (08192) 231271 L.E. Bhavikatti, (08472) 261400 Renuka Book Depot, (0836) 4257624 Sapna Book House, (0836) 4249999 School Book Co., (0824) 2496938, 4281777 Sapna Book House, (0824) 4232800 Sapna Book House, (0821) 4004499 Diana Book Gallery, 09886185310	KOLKATA	
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CONTENTS

- *Latest Syllabus issued by CBSE on 4th April 2017 for Academic Year 2017-18* 4 - 8
- *Examination Paper - 2017 (All sets of Delhi & Outside Delhi)* 9 - 15
- *Topper Answers' 2016* 16 - 31

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- In each chapter, for better understanding, questions have been classified according to the typology issued by CBSE as:

R - *Remembering*, **U** - *Understanding*,

K - *Knowledge* **A** - *Application*.

1. Solid State	1 - 5
2. Solutions	6 - 10
3. Electrochemistry	11 - 15
4. Chemical Kinetics	16 - 20
5. Surface Chemistry	21 - 24
6. General Principles and Processes of Isolation of Elements	25 - 27
7. The <i>p</i> -Block Elements	28 - 33
8. The <i>d</i> -Block and <i>f</i> -Block Elements	34 - 38
9. Co-ordination Compounds	39 - 42
10. Haloalkanes and Haloarenes	43 - 46
11. Alcohols, Phenols and Ethers	47 - 51
12. Aldehydes, Ketones and Carboxylic Acids	52 - 57
13. Organic Compounds Containing Nitrogen	58 - 61
14. Biomolecules	62 - 65
15. Polymers	66 - 68
16. Chemistry in Everyday life	69 - 71



Latest Syllabus for Academic Year 2017-18

Chemistry (043)

Class XII

Total Periods (Theory 160 + Practical 60)

One Paper

Time : 3 Hours

70 Marks

Unit No.	Title	No. of Periods	Marks
Unit I	Solid State	10	23
Unit II	Solutions	10	
Unit III	Electrochemistry	12	
Unit IV	Chemical Kinetics	10	
Unit V	Surface Chemistry	08	
Unit VI	General Principles and Processes of Isolation of Elements	08	19
Unit VII	<i>p</i> -Block Elements	12	
Unit VIII	<i>d</i> - and <i>f</i> - Block Elements	12	
Unit IX	Co-ordination Compounds	12	28
Unit X	Haloalkanes and Haloarenes	10	
Unit XI	Alcohols, Phenols and Ethers	10	
Unit XII	Aldehydes, Ketones and Carboxylic Acids	10	
Unit XIII	Organic Compounds containing Nitrogen	10	
Unit XIV	Biomolecules	12	
Unit XV	Polymers	08	
Unit XVI	Chemistry in Everyday Life	06	
	Total	160	70

- Unit I: Solid State** **10 Periods**
 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** **10 Periods**
 Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties - relative lowering of vapour pressure, Raoult's law, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Van't Hoff factor.
- Unit III: Electrochemistry** **12 Periods**
 Redox reactions, conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Kohlrausch's Law, electrolysis and law 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** **10 Periods**
 Rate of a reaction (Average and instantaneous), factors affecting rate 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** **08 Periods**
 Adsorption - physisorption and chemisorption, factors affecting adsorption of gases on solids, catalysis, homogenous and heterogenous activity and selectivity; enzyme catalysis colloidal state distinction between true solutions, colloids and suspension; lyophilic, lyophobic multi-molecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation, emulsion - types of emulsions.
- Unit VI: General Principles and Processes of Isolation of Elements** **08 Periods**
 Principles and methods of extraction - concentration, oxidation, reduction - electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and iron.
- Unit VII: "p"-Block Elements** **12 Periods**
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 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** **12 Periods**
 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** **12 Periods**
 Coordination compounds - Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds. Bonding, Werner's theory, VBT, and CFT; structure and stereoisomerism, importance of coordination compounds (in qualitative inclusion, extraction of metals and biological system).
- Unit X: Haloalkanes and Haloarenes.** **10 Periods**
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 in monosubstituted compounds only).
 Uses and environmental effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.
- Unit XI: Alcohols, Phenols and Ethers** **10 Periods**
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 **10 Periods**

Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, mechanism of nucleophilic addition, 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 **10 Periods**

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

Cyanides and Isocyanides - will be mentioned at relevant places in text.

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

Unit XIV : Biomolecules **12 Periods**

Carbohydrates - Classification (aldoses and ketoses), monosaccharides (glucose and fructose), D-L configuration oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen); Importance of carbohydrates.

Proteins -Elementary idea of - amino acids, peptide bond, polypeptides, proteins, structure of proteins -primary, secondary, tertiary structure and quaternary structures (qualitative idea only), denaturation of proteins; enzymes. Hormones - Elementary idea excluding structure.

Vitamins - Classification and functions.

Nucleic Acids: DNA and RNA.

Unit XV : Polymers **08 Periods**

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 **06 Periods**

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.

PRACTICALS

Evaluation Scheme for Examination	Marks
Volumetric Analysis	08
Salt Analysis	08
Content Based Experiment	06
Project work	04
Class record and viva	04
Total	30

PRACTICALS SYLLABUS**60 Periods**

Micro-chemical methods are available for several of the practical experiments.

Wherever possible, such techniques should be used.

A. Surface Chemistry

- (a) Preparation of one lyophilic and one lyophobic sol
Lyophilic sol - starch, egg albumin and gum
Lyophobic sol - aluminium hydroxide, ferric hydroxide, arsenous sulphide.
- (b) Dialysis of sol-prepared in (a) above.
- (c) Study of the role of emulsifying agents in stabilizing the emulsion of different oils.

B. Chemical Kinetics

- (a) Effect of concentration and temperature on the rate of reaction between Sodium Thiosulphate and Hydrochloric acid.

- (b) Study of reaction rates of any one of the following:
- Reaction of Iodide ion with Hydrogen Peroxide at room temperature using different concentration of Iodide ions.
 - Reaction between Potassium Iodate, (KIO_3) and Sodium Sulphite: (Na_2SO_3) using starch solution as indicator (clock reaction).
- C. Thermochemistry**
Any one of the following experiments
- Enthalpy of dissolution of Copper Sulphate or Potassium Nitrate.
 - Enthalpy of neutralization of strong acid (HCl) and strong base (NaOH).
 - Determination of enthalpy change during interaction (Hydrogen bond formation) between Acetone and Chloroform.
- D. Electrochemistry**
Variation of cell potential in $\text{Zn}/\text{Zn}^{2+} \parallel \text{Cu}^{2+}/\text{Cu}$ with change in concentration of electrolytes (CuSO_4 or ZnSO_4) at room temperature.
- E. Chromatography**
- Separation of pigments from extracts of leaves and flowers by paper chromatography and determination of R_f values.
 - Separation of constituents present in an inorganic mixture containing two cations only (constituents having large difference in R_f values to be provided).
- F. Preparation of Inorganic Compounds**
- Preparation of double salt of Ferrous Ammonium Sulphate or Potash Alum.
 - Preparation of Potassium Ferric Oxalate.
- G. Preparation of Organic Compounds**
Preparation of any one of the following compounds
- Acetanilide
 - Di-benzal Acetone
 - p-Nitroacetanilide
 - Aniline yellow or 2-Naphthol Aniline dye.
- H. Tests for the functional groups present in organic compounds :**
Unsaturation, alcoholic, phenolic, aldehydic, ketonic, carboxylic and amino (Primary) groups.
- I. Characteristic tests of carbohydrates, fats and proteins in pure samples and their detection in given food stuffs.**
- J. Determination of concentration/ molarity of KMnO_4 solution by titrating it against a standard solution of :**
- Oxalic acid,
 - Ferrous Ammonium Sulphate
- (Students will be required to prepare standard solutions by weighing themselves).
- K. Qualitative analysis**
Determination of one cation and one anion in a given salt.
Cation - Pb^{2+} , Cu^{2+} , As^{3+} , Al^{3+} , Fe^{3+} , Mn^{2+} , Zn^{2+} , Cu^{2+} , Co^{2+} , Ni^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , Mg^{2+} , NH_4^+
Anions - CO_3^{2-} , S^{2-} , SO_3^{2-} , SO_4^{2-} , NO_2^- , Cl^- , Br^- , I^- , PO_4^{3-} , $\text{C}_2\text{O}_4^{2-}$, CH_3COO^-
(Note: Insoluble salts excluded)

PROJECT

Scientific investigations involving laboratory testing and collecting information from other sources.

A few suggested Projects.

- Study of the presence of oxalate ions in guava fruit at different stages of ripening.
- Study of quantity of casein present in different samples of milk.
- Preparation of soybean milk and its comparison with the natural milk with respect to curd formation, effect of temperature, etc.
- Study of the effect of Potassium Bisulphate as food preservative under various conditions (temperature, concentration, time, etc.)
- Study of digestion of starch by salivary amylase and effect of pH and temperature on it.
- Comparative study of the rate of fermentation of following materials: wheat flour, gram flour, potato juice, carrot juice, etc.
- Extraction of essential oils present in Saunf (aniseed), Ajwain (carom), Elaichi (cardamom).
- Study of common food adulterants in fat, oil, butter, sugar, turmeric powder, chilli powder and pepper.

Note: Any other investigatory project, which involves about 10 periods of work, can be chosen with the approval of the teacher.

QUESTION PAPER DESIGN 2017-18

S. No.	Typology of Questions	VSA (1 mark)	SA-I (2 mark)	SA-II (3 mark)	VBQ (4 mark)	LA (5 mark)	Total Marks	% Weightage
1.	Remembering- (Knowledge based) Simple recall questions, to know specific facts, terms, concepts, principles, or theories, Identify, define, or recite, information)	2	1	1	-	-	7	10%
2.	Understanding- Comprehension - to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase information)	-	2	4	-	1	21	30%
3.	Application (Use abstract information in concrete situation, to apply knowledge to new situations, Use given content to interpret a situation, provide an example, or solve a problem)	-	2	4	-	1	21	30%
4.	High Order Thinking Skills (Analysis & Synthesis- Classify, compare, contrast, or differentiate between different pieces of information, Organize and/or integrate unique pieces of information from a variety of sources)	2	-	1	-	1	10	14%
5.	Evaluation - (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	1	-	2	1	-	11	16%
TOTAL		5×1=5	5×2=10	12×3=36	1×4=4	3×5=15	70(26)	100%

QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No. of Questions	Total Marks
VSA	1	5	05
SA-I	2	5	10
SA-II	3	12	36
VBQ	4	1	04
LA	5	3	15
Total		26	70

1. *Internal Choice : There is no overall choice in the paper. However, there is an internal choice in one questions of 2 marks weightage, one question of 3 marks weightage and all the three questions of 5 marks weightage.*
2. *The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same.*

**EXAMINATION
PAPER**

**C.B.S.E.
2017
Class–XII
Delhi & Outside Delhi**

Chemistry

Time allowed : 3 Hours

Max. Marks : 70

General Instructions :

- (i) All questions are compulsory.
- (ii) Q. no. 1 to 5 are very short answer questions and carry 1 mark each.
- (iii) Q. no. 6 to 10 are short answer questions and carry 2 marks each.
- (iv) Q. no. 11 to 22 are also short answer questions and carry 3 marks each.
- (v) Q. no. 23 is a value based questions and carry 4 marks.
- (vi) Q. no. 24 to 26 are long answer questions and carry 5 marks each.
- (vii) Use log tables if necessary, use of **calculators** is **not** allowed.

Delhi Set-I

Code No. 56/1/1

1. Write the formula of an oxo-anion of Manganese (Mn) in which it shows the oxidation state equal to its group number. **1**
2. Write IUPAC name of the following compound :
(CH₃CH₂)₂NCH₃ **1**
3. For a reaction R → P, half-life (t_{1/2}) is observed to be independent of the initial concentration of reactants. What is the order of reaction ? **1**
4. Write the structure of 1-Bromo-4-chlorobut-2-ene. **1**
5. Write one similarity between Physisorption and Chemisorption. **1**
6. Complete the following reactions :
(i) NH₃ + 3Cl₂ (excess) →
(ii) XeF₆ + 2H₂O →
OR
What happens when
(i) (NH₄)₂Cr₂O₇ is heated ?
(ii) H₃PO₃ is heated ?
Write the equation. **1 + 1 = 2**
7. Define the following terms :
(i) Colligative properties
(ii) Molality (m) **1 + 1 = 2**
8. Draw the structures of the following :
(i) H₂S₂O₇
(ii) XeF₆ **1 + 1 = 2**
9. Calculate the degree of dissociation (α) of acetic acid if its molar conductivity (Λ_m) is 39.05 S cm² mol⁻¹.
Given λ°(H⁺) = 349.6 S cm² mol⁻¹ and λ°(CH₃COO⁻) = 40.9 S cm² mol⁻¹. **2**
10. Write the equations involved in the following reactions :
(i) Wolff-Kishner reduction
(ii) Etard reaction. **2**
11. A 10% solution (by mass) of sucrose in water has freezing point of 269.15 K. Calculate the freezing point of 10% glucose in water, if freezing point of pure water is 273.15 K.
Given : (Molar mass of sucrose = 342 g mol⁻¹)
(Molar mass of glucose = 180 g mol⁻¹) **3**
12. (a) Calculate the mass of Ag deposited at cathode when a current of 2 amperes was passed through a solution of AgNO₃ for 15 minutes.
(Given : Molar mass of Ag = 108 g mol⁻¹, 1 F = 96500 C mol⁻¹)
(b) Define fuel cell. **2 + 1 = 3**
13. (i) What type of isomerism is shown by the complex [Co(NH₃)₆][Cr(CN)₆] ?
(ii) Why a solution of [Ni(H₂O)₆]²⁺ is green while a solution of [Ni(CN)₄]²⁻ is colourless ? (At. no. of Ni = 28).
(iii) Write the IUPAC name of the following complex :
[Co(NH₃)₅(CO₃)] Cl. **1 × 3 = 3**
14. Write one difference in each of the following :
(i) Lyophobic sol and Lyophilic sol
(ii) Solution and Colloid
(iii) Homogeneous catalysis and Heterogeneous catalysis. **1 × 3 = 3**
15. Following data are obtained for the reaction :
N₂O₅ → 2NO₂ + ½O₂

t/s	0	300	600
[N ₂ O ₅]/mol L ⁻¹	1.6 × 10 ⁻²	0.8 × 10 ⁻²	0.4 × 10 ⁻²

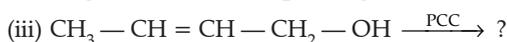
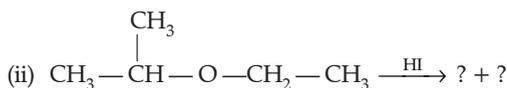
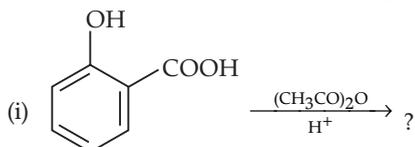
- (a) Show that it follows first order reaction.
 (b) Calculate the half-life.
 (Given $\log 2 = 0.3010$ $\log 4 = 0.6021$) 3
16. Following compounds are given to you :
 2-Bromopentane, 2-Bromo-2-methylbutane,
 1-Bromopentane
- (i) Write the compound which is most reactive towards S_N2 reaction.
 (ii) Write the compound which is optically active.
 (iii) Write the compound which is most reactive towards β -elimination reaction. 1 × 3 = 3
17. (a) Write the principle of method used for the refining of germanium.
 (b) Out of PbS and $PbCO_3$ (ores of lead), which one is concentrated by froth floatation process ?
 (c) What is significance of leaching in the extraction of aluminium ? 1 × 3 = 3
18. Write structures of compounds A, B and C in each of the following reaction :
- (i) $C_6H_5Br \xrightarrow{Mg/dry\ ether}$

$$A \xrightarrow[(b) H_3O^+]{(a) CO_2(g)} B \xrightarrow{PCl_3} C$$
- (ii) $CH_3CN \xrightarrow[(b) H_3O^+]{(a) SnCl_2/HCl}$

$$A \xrightarrow{dil. NaOH} B \xrightarrow{\Delta} C$$
- OR**
- Do the following conversions in not more than two steps :
- (i) Benzoic acid to benzaldehyde
 (ii) Ethyl benzene to Benzoic acid
 (iii) Propanone to Propene 1 × 3 = 3
19. Write the structures of the monomers used for getting the following polymers :
- (i) Dacron
 (ii) Melamine - formaldehyde polymer
 (iii) Buna-N 1 × 3 = 3
20. Define the following :
- (i) Anionic detergents
 (ii) Broad spectrum antibiotics
 (iii) Antiseptic 1 × 3 = 3
21. Give reasons :
- (i) Thermal stability decreases from H_2O to H_2Te .
 (ii) Fluoride ion has higher hydration enthalpy than chloride ion.
 (iii) Nitrogen does not form pentahalide. 1 × 3 = 3
22. Give reasons :
- (i) Acetylation of aniline reduces its activation effect.
 (ii) CH_3NH_2 is more basic than $C_6H_5NH_2$.
- (iii) Although $-NH_2$ is o/p directing group, yet aniline on nitration gives a significant amount of m-nitroaniline. 1 × 3 = 3
23. After watching a programme on TV about the presence of carcinogens (cancer causing agents) Potassium bromate and Potassium iodate in bread and other bakery products, Ritu a class XII student decided to aware others about the adverse effects of these carcinogens in foods. She consulted the school principal and requested him to instruct canteen contractor to stop selling sandwiches, pizza, burgers and other bakery products to the students. Principal took an immediate action and instructed the canteen contractor to replace the bakery products with some proteins and vitamins rich food like fruits, salads, sprouts etc. The decision was welcomed by the parents and students. After reading the above passage, answer the following questions :
- (i) What are the values (at least two) displayed by Ritu ?
 (ii) Which polysaccharide component of carbohydrates is commonly present in bread ?
 (iii) Write the two types of secondary structure of proteins.
 (iv) Give two examples of water soluble vitamins. 4
24. (a) Account for the following :
- (i) Transition metals form large number of complex compounds.
 (ii) The lowest oxide of transition metal is basic whereas the highest oxide is amphoteric or acidic.
 (iii) E° value for the Mn^{3+}/Mn^{2+} couple is highly positive (+1.57 V) as compare to Cr^{3+}/Cr^{2+} .
- (b) Write one similarity and one difference between the chemistry of lanthanoid and actinoid elements.
- OR**
- (a) (i) How is the variability in oxidation states of transition metals different from that of the p-block elements ?
 (ii) Out of Cu^+ and Cu^{2+} , which ion is unstable in aqueous solution and why ?
 (iii) Orange colour of $Cr_2O_7^{2-}$ ion changes to yellow when treated with an alkali. Why ?
- (b) Chemistry of actinoids is complicated as compared to lanthanoids. Give two reasons. 3 + 2 = 5
25. (a) An element has atomic mass 93 g mol^{-1} and density 11.5 g cm^{-3} . If the edge length of its unit cell is 300 pm, identify the type of unit cell.
 (b) Write any two differences between amorphous solids and crystalline solids.

OR

- (a) Calculate the number of unit cells in 8.1 g of aluminium if it crystallizes in a f.c.c. structure. (Atomic mass of Al = 27 g mol⁻¹)
- (b) Give reasons :
- In stoichiometric defects, NaCl exhibits Schottky defect and not Frenkel defect.
 - Silicon on doping with Phosphorus forms n-type semiconductor.
 - Ferrimagnetic substances show better magnetism than antiferromagnetic substances. 2 + 3 = 5
26. (a) Write the product (s) in the following reactions :

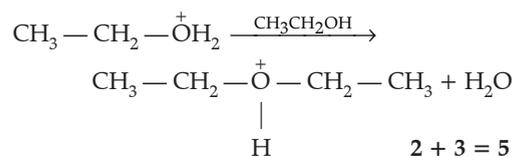


- (b) Give simple chemical tests to distinguish between the following pairs of compounds :

- Ethanol and Phenol
- Propanol and 2-methylpropan-2-ol

OR

- (a) Write the formula of reagents used in the following reactions :
- Bromination of phenol to 2, 4, 6-tribromophenol
 - Hydroboration of propene and then oxidation to propanol.
- (b) Arrange the following compound groups in the increasing order of their property indicated :
- p*-nitrophenol, ethanol, phenol (acidic character)
 - Propanol, Propane, Propanal (boiling point)
- (c) Write the mechanism (using curved arrow notation) of the following reaction :

**Delhi Set-II****Code No. 56/1/2**

- Write the structure of 2,4-dinitrochlorobenzene. 1
 - Write IUPAC name of the following compound :
 $\text{CH}_3\text{NHCH}(\text{CH}_3)_2$ 1
 - Write the formula of an oxo-anion of Chromium (Cr) in which it shows the oxidation state equal to its group number. 1
 - Draw the structures of the following :
(i) H_3PO_2 (ii) XeF_4 2
 - Define the following terms :
(i) Ideal solution (ii) Molarity (M) 2
 - Complete the following reactions :
(i) $\text{Cl}_2 + \text{H}_2\text{O} \longrightarrow$
(ii) $\text{XeF}_6 + 3\text{H}_2\text{O} \longrightarrow$
- OR
- What happens when
- conc. H_2SO_4 is added to Cu ?
 - SO_3 is passed through water ?
Write the equations. 1 + 1 = 2
- Write the reactions involved in the following :
(i) Hell-Volhard Zelinsky reaction
(ii) Decarboxylation reaction 1 + 1 = 2
 - Write the principles of the following methods :
(i) Vapour phase refining
(ii) Zone refining
(iii) Chromatography 1 × 3 = 3
 - Define the following :
(i) Cationic detergents
(ii) Narrow spectrum antibiotics
(iii) Disinfectants 1 × 3 = 3
 - Write the structures of the monomers used for getting the following polymers :
(i) Neoprene
(ii) Melamine-formaldehyde polymer
(iii) Buna-S 1 × 3 = 3

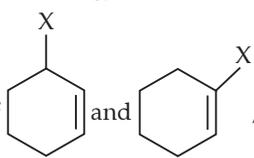
Delhi Set-III**Code No. 56/1/3**

- What is the effect of catalyst on :
(i) Gibbs energy (ΔG) and
(ii) activation energy of a reaction ? 1
- Write the structure of 3-Bromo-2-methylprop-1-ene. 1
- Write IUPAC name of the following compound :
 $(\text{CH}_3)_2\text{N} - \text{CH}_2\text{CH}_3$ 1
- Write the reactions involved in the following reaction :
(i) Clemmensen reduction
(ii) Cannizzaro reaction 1 + 1 = 2
- Draw the structures of the following :
(i) $\text{H}_4\text{P}_2\text{O}_7$ (ii) XeOF_4 1 + 1 = 2
- Define the following terms :

- (i) Abnormal molar mass
(ii) van't Hoff factor (i) $1 + 1 = 2$
10. Complete the following chemical equations :
(i) $F_2 + 2Cl^- \longrightarrow$
(ii) $2XeF_2 + 2H_2O \longrightarrow$
OR
What happens when
(i) HCl is added to MnO_2 ?
(ii) PCl_5 is heated ?
Write the equations involved. $1 + 1 = 2$
13. Define the following :
(i) Anionic detergents
(ii) Limited spectrum antibiotics
(iii) Tranquilizers 3
14. Write the structures of the monomers used for getting the following polymers :
- (i) Nylon-6
(ii) Melamine – formaldehyde polymer
(iii) Teflon $1 \times 3 = 3$
19. Write one difference between each of the following :
(i) Multimolecular colloid and Macromolecular colloid
(ii) Sol and Gel
(iii) O/W emulsion and W/O emulsion $1 \times 3 = 3$
20. (i) What type of isomerism is shown by the complex $[Co(en)_3]Cl_3$?
(ii) Write the hybridisation and magnetic character of $[Co(C_2O_4)_3]^{3-}$.
(At. no. of Co = 27)
(iii) Write IUPAC name of the following Complex $[Cr(NH_3)_3Cl_3]$ 3
 $\square\square\square$

Outside Delhi Set-I**Code No. 56/1**

1. Write the formula of the compound of phosphorus which is obtained when conc. HNO_3 oxidises P_4 . 1
2. Write the IUPAC name of the following compound :

$$\begin{array}{c}
 H_3C - C = C - CH_2 - OH \\
 | \quad | \\
 CH_3 \quad Br
 \end{array}$$
 1
3. What is the effect of adding a catalyst on
(i) Activation energy (E_a), and
(ii) Gibbs energy (ΔG) of a reaction ? 1
4. Out of , which is an example of allylic halide ? 1
5. What type of colloid is formed when a liquid is dispersed in a solid ? Give an example. 1
6. (a) Arrange the following compounds in the increasing order of their acid strength :
p-cresol, p-nitrophenol, phenol
(b) Write the mechanism (using curved arrow notation) of the following reaction :

$$CH_2 = CH_2 \xrightarrow{H_3O^+} CH_3 - CH_2^+ + H_2O$$
OR
 Write the structures of the products when Butan-2-ol reacts with the following :
(a) CrO_3 (b) $SOCl_2$ $1 + 1 = 2$
7. Calculate the number of unit cells in 8.1 g of aluminium if it crystallizes in a face-centred cubic (f.c.c.) structure. (Atomic mass of Al = 27 g mol^{-1}) 2
8. Draw the structures of the following :
(i) H_2SO_3 (ii) $HClO_3$ 2
9. Write the name of the cell which is generally used in hearing aids. Write the reactions taking place at the anode and the cathode of this cell. 2
10. Using IUPAC norms write the formulae for the following :
(a) Sodium dicyanidoaurate (I)
(b) Tetraamminechloridonitrito-N-platinum (IV) sulphate 2
11. (a) Based on the nature of intermolecular forces, classify the following solids :
Silicon carbide, Argon
(b) ZnO turns yellow on heating. Why ?
(c) What is meant by groups 12-16 compounds ? Give an example. 3
12. (a) The cell in which the following reaction occurs :
 $2Fe^{3+}(aq) + 2I^-(aq) \longrightarrow 2Fe^{2+}(aq) + I_2(s)$
 has $E_{cell}^\circ = 0.236 \text{ V}$ at 298 K. Calculate the standard Gibbs energy of the cell reaction. (Given : $1 \text{ F} = 96,500 \text{ C mol}^{-1}$)
(b) How many electrons flow through a metallic wire if a current of 0.5 A is passed for 2 hours ? (Given : $1 \text{ F} = 96,500 \text{ C mol}^{-1}$) 3
13. (a) What type of isomerism is shown by the complex $[Co(NH_3)_5(SCN)]^{2+}$?
(b) Why is $[NiCl_4]^{2-}$ paramagnetic while $[Ni(CN)_4]^{2-}$ is diamagnetic ?
(Atomic number of Ni = 28)
(c) Why are low spin tetrahedral complexes rarely observed ? $1 \times 3 = 3$
14. Write one difference in each of the following :
(a) Multimolecular colloid and Associated colloid
(b) Coagulation and Peptization

- (c) Homogeneous catalysis and Heterogeneous catalysis

OR

- (a) Write the dispersed phase and dispersion medium of milk.
- (b) Write one similarity between physisorption and chemisorption.
- (c) Write the chemical method by which $\text{Fe}(\text{OH})_3$ sol is prepared from FeCl_3 . $1 \times 3 = 3$
15. A first order reaction takes 20 minutes for 25% decomposition. Calculate the time when 75% of the reaction will be completed.
(Given : $\log 2 = 0.3010$, $\log 3 = 0.4771$, $\log 4 = 0.6021$) 3
16. The following compounds are given to you :
2-Bromopentane, 2-Bromo-2-methylbutane, 1-Bromopentane
- (a) Write the compound which is most reactive towards $\text{S}_{\text{N}}2$ reaction.
- (b) Write the compound which is optically active.
- (c) Write the compound which is most reactive towards β -elimination reaction. $1 \times 3 = 3$
17. Write the principle of the following :
- (a) Zone refining
- (b) Froth floatation process
- (c) Chromatography $1 \times 3 = 3$
18. Write the structures of compounds A, B and C in the following reactions :
- (a) $\text{CH}_3 - \text{COOH} \xrightarrow{\text{NH}_3/\Delta}$
 $\text{A} \xrightarrow{\text{Br}_2/\text{KOH}(\text{aq})} \text{B} \xrightarrow{\text{CHCl}_3 + \text{alc. KOH}} \text{C}$
- (b) $\text{C}_6\text{H}_5\text{N}_2^+\text{BF}_4^- \xrightarrow[\Delta]{\text{NaNO}_2/\text{Cu}}$
 $\text{A} \xrightarrow{\text{Fe/HCl}} \text{B} \xrightarrow{\text{CH}_3\text{COCl}/\text{pyridine}} \text{C}$ 3
19. Write the structures of the monomers used for getting the following polymers :
- (a) Nylon-6, 6
- (b) Melamine-formaldehyde polymer
- (c) Buna-S $1 \times 3 = 3$
20. Define the following :
- (a) Anionic detergents
- (b) Limited spectrum antibiotics
- (c) Antiseptics $1 \times 3 = 3$
21. Give reasons for the following :
- (a) Red phosphorus is less reactive than white phosphorus.
- (b) Electron gain enthalpies of halogens are largely negative.
- (c) N_2O_5 is more acidic than N_2O_3 . $1 \times 3 = 3$

22. Give reasons for the following :

- (a) Acetylation of aniline reduces its activation effect.
- (b) CH_3NH_2 is more basic than $\text{C}_6\text{H}_5\text{NH}_2$.
- (c) Although $-\text{NH}_2$ is o/p directing group, yet aniline on nitration gives a significant amount of m-nitroaniline. $1 \times 2 = 3$

23. After watching a programme on TV about the presence of carcinogens (cancer causing agents) Potassium bromate and Potassium iodate in bread and other bakery products, Rupali a Class XII student decided to make others aware about the adverse effects of these carcinogens in foods. She consulted the school principal and requested him to instruct the canteen contractor to stop selling sandwiches, pizzas, burgers and other bakery products to the students. The principal took an immediate action and instructed the canteen contractor to replace the bakery products with some protein and vitamin rich food like fruits, salads, sprouts, etc. The decision was welcomed by the parents and the students. After reading the above passage, answer the following questions :

- (a) What are the values (at least two) displayed by Rupali ?
- (b) Which polysaccharide component of carbohydrates is commonly present in bread ?
- (c) Write the two types of secondary structures of proteins.
- (d) Give two examples of water soluble vitamins. 4

24. (a) Account for the following :

- (i) Transition metals show variable oxidation states.
- (ii) Zn, Cd and Hg are soft metals.
- (iii) E° value for the $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple is highly positive (+ 1.57 V) as compared to $\text{Cr}^{3+}/\text{Cr}^{2+}$.
- (b) Write one similarity and one difference between the chemistry of lanthanoid and actinoid elements.

OR

- (a) Following are the transition metal ions of 3d series :
 Ti^{4+} , V^{2+} , Mn^{3+} , Cr^{3+}
(Atomic numbers : Ti = 22, V = 23, Mn = 25, Cr = 24)
Answer the following :
- (i) Which ion is most stable in an aqueous solution and why ?
- (ii) Which ion is a strong oxidising agent and why ?
- (iii) Which ion is colourless and why ?

(b) Complete the following equations :



25. (a) A 10% solution (by mass) of sucrose in water has a freezing point of 269.15 K. Calculate the freezing point of 10% glucose in water if the freezing point of pure water is 273.15 K.

Given :

(Molar mass of sucrose = 342 g mol^{-1})

(Molar mass of glucose = 180 g mol^{-1})

(b) Define the following terms :

(i) Molality (m)

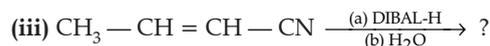
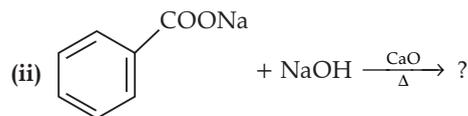
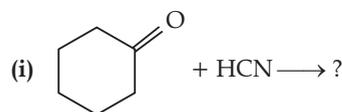
(ii) Abnormal molar mass

OR

- (a) 30 g of urea ($M = 60 \text{ g mol}^{-1}$) is dissolved in 846 g of water. Calculate the vapour pressure of water for this solution if vapour pressure of pure water at 298 K is 23.8 mm Hg.

(b) Write two differences between ideal solutions and non-ideal solutions. 3 + 2 = 5

26. (a) Write the product (s) in the following reactions :



(b) Give simple chemical tests to distinguish between the following pairs of compounds :

(i) Butanal and Butan-2-one

(ii) Benzoic acid and Phenol

OR

(a) Write the reactions involved in the following :

(i) Etard reaction

(ii) Stephen reduction

(b) How will you convert the following in not more than two steps :

(i) Benzoic acid to Benzaldehyde

(ii) Acetophenone to Benzoic acid

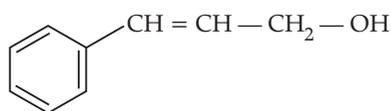
(iii) Ethanoic acid to 2-Hydroxyethanoic acid

2 + 3 = 5

Outside Delhi Set-II

Code No. 56/2

3. Write the IUPAC name of the following compound :



6. Using IUPAC norms write the formulae for the following :

(a) Tris (ethane-1, 2-diamine) chromium (III) chloride

(b) Potassium tetrahydrozincate (II) 2

7. Draw the structures of the following :

(a) $\text{H}_2\text{S}_2\text{O}_8$ (b) ClF_3 2

11. (a) Write the principle of vapour phase refining.

(b) Write the role of dilute NaCN in the extraction of silver.

(c) What is the role of collectors in the froth floatation process ? Give an example of a collector. 1 × 3 = 3

16. Define the following :

(a) Anionic detergents

(b) Narrow spectrum antibiotics

(c) Antacids 1 × 3 = 3

17. Write the structures of the monomers used for getting the following polymers :

(a) Polyvinyl chloride (PVC)

(b) Melamine-formaldehyde polymer

(c) Buna-N 1 × 3 = 3

22. (a) Based on the nature of intermolecular forces, classify the following solids :

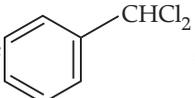
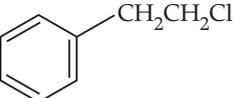
Benzene, Silver

(b) AgCl shows Frenkel defect while NaCl does not. Give reason.

(c) What type of semiconductor is formed when Ge is doped with Al ? 3

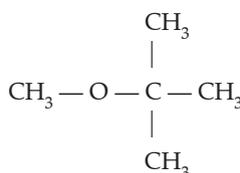
Outside Delhi Set-III

Code No. 56/3

1. Out of  and , which is an example of a benzylic halide ? 1

3. Write the formula of the compound of iodine which is obtained when conc. HNO_3 oxidises I_2 . 1

5. Write the IUPAC name of the following compound :

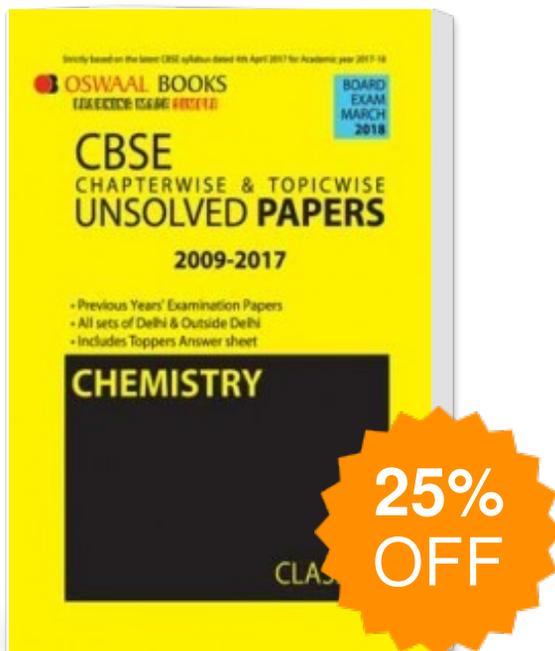


6. Draw the structures of the following :

(a) XeF_4

(b) BrF_5 2

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