NCERT

OBJECTIVE

CHEMISTRY

Chapterwise Solved Papers

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Publisher Declaration
Edited and Published by A.K. Mahajan for YCT Publications Pvt. Ltd.
and Printed by Digital In order to Publish the book,
full care has been taken by the Editor and the Publisher,
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₹ : 1195/-

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Laws of chemical combination.

Atomic and molecular masses.

Mole concept, molar mass, percentage composition, empirical and molecular formulae.

Chemical equations and stoichiometry.

UNIT 2

ATOMIC STRUCTURE

Nature of electromagnetic radiation,

Photoelectric effect;

Spectrum of the hydrogen atom.

Bohr model of a hydrogen atom and its postulates.

Derivation of the relations for the energy of the electron and radii of the different orbits for Bohr's model.

Limitations of Bohr's model.

Dual nature of matter.

De-de Broglie's relationship.

Heisenberg uncertainty principle.

Elementary ideas of quantum mechanics and Quantum mechanics.

The quantum mechanical model of the atom its and important features.

Concept of atomic orbitals as one-electron wave functions.

Variation of Ψ and Ψ^2 with r for ls and 2s orbitals.

Various quantum numbers (principal, angular momentum, and magnetic quantum numbers) and their significance.

Shapes of s, p, and d – orbitals.

Electron spin and spin quantum number:

Rules for filling electrons in orbitals - Aufbau principle, Pauli's exclusion principle and Hund's rule.

Electronic configuration of elements, extra stability of half-filled and completely filled orbitals.

UNIT-3

CHEMICAL BONDING AND MOLECULAR STRUCTURE

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The concept of ionic and covalent bonds.

Ionic Bonding: Formation of ionic bonds and factors affecting its formation.

Calculation of lattice enthalpy.

Covalent Bonding: concept of electronegativity.

Fajan's rule.

Dipole moment.

VSEPR theory and shapes of simple molecules.

Quantum mechanical approach to covalent bonding.

Valence bond theory and its important features.

The concept of hybridization involving s, p, and d orbitals.

Resonance.

Molecular orbital Theory

Its important features.

LCAOs, types of molecular orbitals (bonding, antibonding),

Sigma and pi-bonds,

Molecular orbital electronic configurations of homonuclear diatomic molecules,

The concept of bond order, Bond length and bond energy.

Elementary idea of metallic bonding.

Hydrogen bonding and is applications.

UNIT-4

CHEMICAL THERMODYNAMICS

Fundamentals of thermodynamics: system and surroundings, Extensive and intensive properties.

State functions.

Types of processes.

The first law of thermodynamics

Concept of work.

Heat internal energy and enthalpy.

Heat capacity and Molar heat capacity.

Hess's law of constant heat summation:

Enthalpies of bond dissociation, Combustion, Formation, Atomization. Sublimation.

Phase transition, Hydration, Ionization and solution.

The second law of thermodynamics

Spontaneity of processes; ΔS of the universe and ΔG of the system as criteria for spontaneity.

ΔG° (Standard Gibbs energy change).

Equilibrium constant.

Unit-5

SOLUTIONS

Expressing the concentration of solution: Molality, molarity, mole fraction, percentage (by volume and mass both),

The vapour pressure of solutions.

Raoult's Law–Ideal and non-ideal solutions.

Vapour pressure composition and Plots for ideal and non-ideal solutions.

Colligative properties of dilute solutions :

A relative lowering of vapour pressure.

Depression of freezing point.

The elevation of boiling point and osmotic pressure.
Determination of molecular mass using colligative properties.
Abnormal value of molar mass and Van't Hoff factor and its significance.

UNIT-6

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General characteristics of equilibrium involving physical processes.

Equilibrium involving chemical processes :

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Equilibrium constants (K_p and K_c) and their significance,
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Factors affecting equilibrium concentration: Pressure, temperature and catalyst.
Le Chatelier's principle.

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UNIT-7

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Nernst equation and its applications.
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UNIT-8

CHEMICAL KINETICS

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Elementary and complex reactions.
Order and molecularity of reactions.
Rate law, rate constant and its units.
Differential and integral forms of zero and first-order reactions.
Characteristics and half-lives of zero and first-order reactions.
The effect of temperature on the rate of reactions.
Arrhenius theory, Activation energy and its calculation.
Collision theory of bimolecular gaseous reactions (no derivation).

INORGANIC CHEMISTRY

UNIT-9

CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

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s,p,d and f block elements.
Periodic trends in properties of elements atomic and ionic radii, Ionization enthalpy, Electron gain enthalpy.
Valency, Oxidation states and chemical reactivity.

UNIT-10

P-BLOCK ELEMENTS

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General Introduction :

Electronic configuration
General trends in physical and chemical properties of elements.
Unique behaviour of the first element in each group.

UNIT-11

D-AND F-BLOCK ELEMENTS

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General introduction and Electronic configuration.
Occurrence and characteristics,
General trends in properties of the first-row transition elements - physical properties, Ionization enthalpy, Oxidation states, Atomic radii, Colour, catalytic behaviour, Magnetic properties.

Complex formation.

Interstitial compounds.

Alloy formation.

Preparation, properties, and uses of $K_2Cr_2O_7$, and $KMnO_4$.

Inner Transition Elements

Lanthanoids - Electronic configuration, oxidation states, and lanthanoid contraction.

Actinoids - Electronic configuration and oxidation states.

UNIT-12

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IUPAC nomenclature of mononuclear co-ordination compounds,

Isomerism.

Bonding-Valence bond approach.

Basic ideas of Crystal field theory and Colour and magnetic properties.

Importance of co-ordination compounds (in qualitative analysis, extraction of metals and in biological systems).

ORGANIC CHEMISTRY

UNIT-13

PURIFICATION AND CHARACTERISATION OF ORGANIC COMPOUNDS

Purification -

Crystallization,

Sublimation,

Distillation,

Differential Extraction

Chromatography - principles and their applications.

Qualitative analysis -

Detection of nitrogen.

Detection of Sulphur.

Detection of Phosphorus.

Detection of Halogens.

Quantiative analysis (basic principles only) -

Estimation of carbon.

Estimation of Hydrogen.

Estimation of Nitrogen.

Estimation of Halogens.

Estimation of Sulphur.

Estimation of Phosphorus.

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Homologous series.

Isomerism - structural and stereoisomerism.

Nomenclature (Trivial and IUPAC)

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Stability of carbocations and free radicals.

Electrophiles and nucleophiles.

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Electromeric effect.

Resonance and hyperconjugation.

Common types of organic reactions–

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Addition reaction.

Elimination and rearrangement.

UNITS-15

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Isomerism.

IUPAC nomenclature.

General methods of preparation and Properties, and reactions.

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Mechanism of halogenation of alkanes.

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Geometrical isomerism : Mechanism of electrophilic addition :

Addition of hydrogen, halogens,

Water, hydrogen halides (Markownikoffs and peroxide effect) :

Ozonolysis and polymerization).

Alkynes -

Acidic character :

Addition of hydrogen, halogens, water, and hydrogen halides :

Polymerization.

Aromatic hydrocarbons –

Nomenclature.

Benzene - structure and aromaticity.

Mechanism of electrophilic substitution: Halogenation, nitration.

Friedel - Craft's alkylation and acylation.

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UNIT-16

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Mechanisms of substitution reactions.

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UNIT-17

ORGANIC COMPOUNDS CONTAINING OXYGEN

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Properties, Reactions and uses.

ALCOHOLS, PHENOLS, AND ETHERS

Alcohols :

Identification of primary, secondary, and tertiary alcohols.

Mechanism of dehydration.

Phenols :

Acidic nature.

Electrophilic substitution reactions : Halogenation, nitration and sulphonation.

Reimer - Tiemann reaction.

Ethers : Structure.

Aldehyde and Ketones :

Nature of carbonyl group.

Nucleophilic addition to >C = O group.

Relative reactivities of aldehydes and ketones.

Important reactions: Nucleophilic addition reactions (addition of HCN, NH_3, and its derivatives), Grignard Reagent, Oxidation, Reduction (Wolf Kishner and Clemmensen).

The acidity of α-hydrogen:

Aldol condensation.

Cannizzaro reaction.

Haloform reaction.

Chemical tests to distinguish between aldehydes and Ketones.

Carboxylic Acids

Acidic strength and factors affecting it.

UNIT-18

ORGANIC COMPOUNDS CONTAINING NITROGEN

Amines :

Nomenclature.

Classification structure.

Basic character and identification of primary, secondary, and tertiary amines and their basicity.

Diazonium Salts : Importance in synthetic organic chemistry.

UNIT-19

BIOMOLECULES

General introduction and importance of biomolecules.

CARBOHYDRATES -

Classification; aldoses and ketoses.

Monosaccharides (glucose and fructose) and constituent monosaccharides of oligosaccharides (sucrose, lactose, and maltose).

PROTEINS –

Elementary idea of α-amino acids, Peptide bond and polypeptides.

Proteins: Primary, secondary, tertiary, and quaternary structure (qualitative idea only).

Denaturationof proteins.

Enzymes.

VITAMINS – Classification and functions.

NUCLEIC ACIDS – Chemical constitution of DNA and RNA.

Biological functions of nucleic acids.

Hormones (General introduction)

UNIT-20

PRINCIPLES RELATED TO PRACTICAL CHEMISTRY

Detection of extra elements (N, S and X) in organic compounds.

Detection of the following functional groups- Hydroxyl (alcoholic and phenolic).

Carbonyl (aldehyde and ketones), carboxyl and amino groups in organic compounds.

- The chemistry involved in the preparation of the following :

  Inorganic compounds: Mohr's salt, potash alum.

  Organic compounds : Acetanilide, p-nitro acetanilide, Aniline yellow, Iodoform.
- The chemistry involved in the titrimetric exercises:

  Acids, bases and the use of indicators,

  Oxalic-acid vs $KMNO_4$,

  Mohr's salt vs $KMnO_4$.
- Chemical principles involved in the qualitative salt analysis :

  Cations – Pb^{2+}, Cu^{2+}, Al^{3+}, Fe^{3+}, Zn^{2+}, Ni^{2+}, Ca^{2+}, Ba^{2+}, Mg^{2+}, NH_5^+

  Anions - S^{2-}, SO_4^{2-}, NO^{3-}, NO^{2-}, CO_3^{2-}, Cl^-, Br^-, I^- (Insoluble salts excluded).

  Chemical principles involved in the following experiments :

  1. Enthalpy of solution of $CuSO_4$
  2. Enthalpy of neutralization of strong acid and strong base.
  3. Preparation of lyophilic and lyophobic sols.
  4. Kinetic study of the reaction of iodide ions with hydrogen peroxide at room temperature.

All India Medical Entrance Exam Chemistry Previous Years Exam Papers Analysis Chart

S. No	Exam	Proposed Year	Question Paper	Total Question
National Eligibility Cum Entrance Test /All India Pre Medical Test (NEET/AIPMT)				
1.	RE-NEET (UG)-	23.06.2024		50
2.	NEET (UG)-	05.05.2024		50
3.	RE NEET -Manipur	06.06.2023		50
4.	NEET	07.05.2023		50
5.	NEET	17.07.2022		50
6.	NEET	12.09.2021		50
7.	NEET	13.09.2020		50
8.	NEET	05.06.2019		50
9.	NEET	06.05.2018		50
10.	NEET	07.05.2017		50
11.	NEET	01.05.2016	Phase-I	50
12.	NEET	24.06.2016	Phase-II	50
13.	NEET/AIPMT	25.07.2015		50
14.	NEET	04.05.2014		50
15.	NEET	05.05.2013		50
16.	AIPMT	2012		50
17.	AIPMT	2011		50
18.	AIPMT	2010		50
19.	AIPMT	2009		50
20.	AIPMT	2008		50
21.	AIPMT	2007		50
22.	AIPMT	2006		50
23.	AIPMT	2005		50
24.	AIPMT	2004		50
25.	AIPMT	2003		50
26.	AIPMT	2002		50
27.	AIPMT	2001		50
28.	AIPMT	2000		50
29.	AIPMT	1999-1988		600
Telangana State Council Higher Education				
30.	Telangna SCHE	08.05.2024	Shift-I	40
31.	Telangana SCHE	07.05.2024	Shift I	40
32.	Telangana SCHE	07.05.2024	Shift II	40

All India Institute of Medical Sciences (AIIMS)				
33.	AIIMS	26.05.2019	Shift-I	60
34.	AIIMS	26.05.2019	Shift-II	60
35.	AIIMS	25.05.2019	Shift-I	60
36.	AIIMS	25.05.2019	Shift-II	60
37.	AIIMS	2018		60
38.	AIIMS	2017		60
39.	AIIMS	2016		60
40.	AIIMS	2015		60
41.	AIIMS	2014		60
42.	AIIMS	2013		60
43.	AIIMS	2012		60
44.	AIIMS	2011		60
45.	AIIMS	2010		60
46.	AIIMS	2009		60
47.	AIIMS	2008		60
48.	AIIMS	2007		60
49.	AIIMS	2006		60
50.	AIIMS	2005		60
51.	AIIMS	2004		60
52.	AIIMS	2003		60
53.	AIIMS	2002		60
54.	AIIMS	2001		60
55.	AIIMS	2000		60
56.	AIIMS	1999-1994		300
Andhra Pradesh Engineering, Agriculture and Medical Common Entrance Test (AP EAMCET)				
57.	AP EAMCET Medical	2013		50
58.	AP EAMCET Medical	2012		50
59.	AP EAMCET Medical	2010		40
60.	AP EAMCET Medical	2009		40
61.	AP EAMCET Medical	2008		40
62.	AP EAMCET Medical	2007		40
63.	AP EAMCET Medical	2006		40
64.	AP EAMCET Medical	2004		40
65.	AP EAMCET Medical	2003		50
66.	AP EAMCET Medical	2002		40
67.	AP EAMCET Medical	2001		40
68.	AP EAMCET Medical	1999		40
69.	AP EAMCET Medical	1998		50
70.	AP EAMCET Medical	1997		50

Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER)				
71.	JIPMER	2019		60
72.	JIPMER	2018		60
73.	JIPMER	2017		60
74.	JIPMER	2016		60
75.	JIPMER	2015		60
76.	JIPMER	2014		60
77.	JIPMER	2013		60
78.	JIPMER	2012		60
79.	JIPMER	2011		60
80.	JIPMER	2010		60
81.	JIPMER	2009		60
82.	JIPMER	2008		60
83.	JIPMER	2007		60
84.	JIPMER	2006		60
85.	JIPMER	2005		60
86.	JIPMER	2004		60
Uttar Pradesh Combined Pre Medical Test (UPCPMT)				
87.	UPCPMT	2014		50
88.	UPCPMT	2013		50
89.	UPCPMT	2012		50
90.	UPCPMT	2011		50
91.	UPCPMT	2010		50
92.	UPCPMT	2009		50
93.	UPCPMT	2008		50
94.	UPCPMT	2007		50
95.	UPCPMT	2006		50
96.	UPCPMT	2005		50
97.	UPCPMT	2004		50
98.	UPCPMT	2003		50
99.	UPCPMT	2002		50
100.	UPCPMT	2001		50
			Total	**6070**

Note : After detailed analysis of above mentioned papers of **NEET** and Other Medical and Engineering Examination Related to **Chemistry** 6070 have been presented chapterwise. Questions of repeated and similar nature have included so that the technique of asking question can benefit the competitors.

01.
Some Basic Concepts in Chemistry

A.1 Dalton's atomic theory: Concept of atom molecule, element and compound, matter and its nature

A1.1 Multiple Choice Question. (MCQS)

1. O_2 and O_3 are

(a) allotropes (b) isotopes
(c) isomorphs (d) polymorphs

UP CPMT-2010

Ans. (a) : Since, in O_2 and O_3 different numbers of same element i.e. oxygen are present, these are allotropes.

Note. Different crystalline structures, different number of atoms and different nuclear spins all result in allotropy.

2. Isotones have

(a) same number of protons
(b) same number of electrons
(c) same number of neutrons
(d) same isotopic mass

UP CPMT-2010

Ans. (c): Species having the same number of neutron but different atomic number as well as atomic mass are called isotones. E.g. $^{39}_{18}Ar$, $^{40}_{19}K$.

3. $_{19}K^{40}$ and $_{20}Ca^{40}$ are known as

(a) isotopes (b) isobars
(c) isotones (d) isodiaphers

UP CPMT-2002

Ans.(b): $_{19}K^{40}$ and $_{20}Ca^{40}$ both have same mass no but different atomic number, are called isobars.

4. Isotopic pair is

(a) $_{20}X^{40}$, $_{21}Y^{40}$ (b) $_{20}X^{40}$, $_{20}Y^{41}$
(c) $_{40}X^{20}$, $_{41}Y^{20}$ (d) None of these

UP CPMT-2005

Ans. (b) : Key Idea: Isotopes are the atoms of same element which have different atomic masses (due to different number of neutrons). They had same atomic numbers.

$\therefore$ choice (b) is the correct answer because both ($_{20}X^{40}$, $_{20}X^{41}$) have same atomic number but different atomic mass.

A.1.2 Statements based question

5. Select the correct statements from the following:

A.	**Atoms of all elements are composed of two fundamental particles.**
B.	**The mass of the electron is 9.10939×10^{-31} kg.**
C.	**All the isotopes of a given element show same chemical properties.**
D.	**Protons and electrons are collectively known as nucleons.**
E.	**Dalton's atomic theory, regarded the atom as an ultimate particle of matter.**

Choose the correct answer from the options given below :

(a) B, C and E only (b) A, B and C only
(c) C, D and E only (d) A and E only

NEET (UG) -07.05.2023

Ans. (a) : (A) Atoms of all elements are composed of two fundamental particles. It is incorrect statement.

(B) The mass of the electron is 9.10939×10^{-31}kg. It is correct statement.

(C) All the isotopes of a given element show same chemical properties is correct statement.

(D) **Nucleons-**Nucleons are equal to number of proton and neutron in the nucleons.

eg-if the given atom of isotope is He_2^4, He_z^A

z = 2 Number of proton.

A = 4 Number of nucleons

A–z = 4–2=2 Number of Neutrons.

(Hence nucleons = Number of protons + neutrons) So It is incorrect option.

(E) Daltons atomic theory, regared the atom as an altimate particles of matter so It is correct statement.

A1.5 Assertion and Reasons.

6. Assertion: Atoms can neither be created nor destroyed.

Reason: Under similar condition of temperature and pressure, equal volume of gases does not contain equal number of atoms.

(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.
(e) If the Assertion is incorrect but the Reason is correct.

AIIMS-2002