QUESTION BANK OF CLASS 11TH CHEMISTRY.

Unit – 1 (Some Basic concept of chemistry)

YEAR 2021

1 Marks.

1. The number of significant figures in 0.50 is :
   (a) 1 (b) 2 (c) 3 (d) 4

YEAR 2023

1 Marks.

1. The mass percent of nitrogen in Ammonia is :
(a) 82.35% (b) 72.35% (c) 62.35% (d) 52.35%

2 Marks.

1. State and explain law of the multiple proportion.
2. State and explain Dalton's law of partial pressure.

YEAR 2024

1 Marks.

1. The number of moles of solute per litre of the solution is known as:
   (a) Molarity (b) Molality (c) Normality (d) Formality

2 Marks.

1. (a) Define a mole?
   (b) The molecular mass of methane is …….

YEAR 2025

1 Marks.

1. 1mole of NaOH is present in 250 ml of solution, the molarity of solution in mol/L will be:
(a) 4 (b) 40 (c) 25 (d) 0.4
2. Define molality?

2 Marks.

1. A solution is prepared by adding 2g of a substance to 18g of water. Calculate the mass percent of the solute.
2. Calculate the number of molecules of sulphuric acid having mass 4.9g.

Unit – 2 (Structure of Atom)

YEAR 2021

1Marks.

1. Photoelectric effect is maximum in:
   (a) Cs (b) K (c) Na (d) Li

2 Marks.

1. Define "Law of conservation of Mass".
2. Define "Law of constant proportions".

YEAR 2023

2Marks.

1. (a)Write a short note on absorption spectra.
   (b) What is Pauli's Exclusion principle.

YEAR 2024

1 Marks.

1. The small portion od an atom where most of the mass of atom is densely concentrated is called:
   (a) Nucleons (b) Nucleus (c) Orbital (d) Extra nuclear part.

2 Marks.

1. Explain isobar and isotopes with examples.
2. Draw the shapes of $d_{x^2-y^2}$ and d_{xy} orbitals.

YEAR 2025

1 Marks.

1. Which of the following set of quantum numbers is not possible?

	n	l	m	s
(a)	4	3	2	-1/2
(b)	3	0	0	+1/2
(c)	2	2	-1	+1/2
(d)	2	1	-1	-1/2

2. Brackett series is formed in hydrogen atom spectrum, when the electrons from higher orbits move to ……. Energy level.

(a) second (b) third (c) fourth (d) fifth

2 Marks.

1. Draw the shapes of all the five d-orbitals.
2. Give four difference between orbit and orbitals.

Unit – 3 (Classification of elements and Periodicity in properties)

YEAR 2021

1 Marks.

1. The number of unpaired electrons in chromium (z=24) is :

(a) 4 (b) 6 (c) 3 (d) 5

2. What is the value of 'n' for 's' subshell?
3. What is the electronic configuration of copper.
4. Define Covalent radius?
5. State Aufbau principle.

2 Marks.

1. Differentiate between orbit and orbital.
2. State and explain Pauli's Exclusion Principle.
3. What is ionization enthalpy? Give its variation down the group in the periodic table.
4. Explain why the size of anion is larger than the size of parent atom.
5. Why lithium shows anomalous behavior with respect to other elements of the group.

YEAR 2022

1 Marks.

1. Write any two properties when lithium is diagonally related to magnesium?

2 Marks.

1. Why alkali metals are soluble in liquid ammonia and solution is highly conducting in nature?

YEAR 2023

1 Marks.

1. The maximum number of electrons that can fit in all the orbitals with n= 2 and l = 1 ?

(a) 8 (b) 2 (c) 6 (d) 4

2. The IUPAC name for the element with atomic number 120 is :

(a) Ununnilium (b) Unbinilium (c) Unbiquadium (d) Unnilquadium

2 Marks.

1. Why half filled and fully filled have extra stability?
2. Why the size of the anion is always greater than that of its parents atom?

YEAR 2024

1 Marks.

1. The electronic configuration ns^2np^6 refers to ……. .

(a) Chalcogens (b) Halogens (c) Noble gases (d) Alkali metals

2. Which group of elements is known as alkaline earth metals?

(a) Group 15 (b) Group 2 (c) Group 1 (d) Group 18

3. Name the isotope of hydrogen which is radioactive in nature.
4. Define diagonal relationship?

2 Marks.

1. Consider the following species:

N^{3-}, F^{-}, Na^{+}, Mg^{2+}, O^{2-}.

(a) What is common in them?

(b) Arrange them in order of increasing ionic radii.

2. Explain the orbital diagram of diborane.

YEAR 2025

1 Marks.

1. An ion B^{2-} has 18 electrons and 16 neutrons. Its mass number will be :

(a) 34 (b) 32 (c) 18 (d) 16

2. Which of the following has higher covalent character?

(a) LiCl (b) NaCl (c) KCl (d) RbCl

3. Write the electronic configuration of chromium.

2 Marks.

1. Define Ionization enthalpy? On what factors does it depends?

2. Why do first three elements of second period show properties similar to the elements of third period placed diagonally?

3. Why does I^{+} have smaller size than I?

Unit – 4 (Chemical bonding and molecular structure)

YEAR 2021

1 Marks.

1. Shape of molecule is trigonal, hybridization involved is :

(a) sp^3 (b) sp^3d (c) sp^2d^2 (d) sp^2

2 Marks.

1. What is Hybridization? Explain sp hybridization by taking an example.

2. Write four difference between sigma and pi bond.

YEAR 2023

1 Marks.

1. Which of the following angle corresponds to sp^2 hybridisation?

(a) 90^o (b) 120^o (c) 180^o (d) 109^o

2. What is dipole moment?

2 Marks.

1. With the help of molecular energy level diagram , determine the bond order and magnetic character of Oxygen molecule.

YEAR 2024

1 Marks.

1. The diagonal hybridization is :

(a) sp^2 (b) sp (c) dsp^2 (d) sp^3

2. Which of the following molecules has zero dipole moment?

(a) NH_3 (b) H_2O (c) $CHCl_3$ (d) CO_2

2 Marks.

1. Explain the shape of BF_3 on the basis of VSEPR theory.

2. Draw molecular orbital diagram for N_2 molecule and explain its stability with bond order.

YEAR 2025

2 Marks.

1. Discuss the shape of ethane molecule on the basis of hybridization.

2. Draw molecular orbital diagram of oxygen molecule. From this diagram predict the bond order and magnetic behavior.

Unit – 5 (Thermodynamics)

YEAR 2021

1 Marks.

1. Gibbs free energy 'G' is defined:

(a) G=H-TS (b) G-H+TS (c) G=H+U-TS (d) G=U-TS

2. For an isolated system, what will be ΔS ?
3. What is enthalpy of neutralization?

2 Marks.

1. What is first law of thermodynamics ? Give its mathematical equation.

YEAR 2022

1 Marks.

1. Isobaric processes are the processes where:
(a) $\Delta H = 0$ (b) $\Delta P = 0$ (c) $\Delta V = 0$ (d) $\Delta G = 0$
2. The system which neither exchange mass nor energy with surroundings is called:
(a) Closed system (b) Isolated system (c) Open system (d) none of these.

2 Marks.

1. Calculate the enthalpy of formation of benzene represented by the following reaction:

$6C\,(s) + 3H_2\,(g) \longrightarrow C_6H_6\,(l)$; $\Delta_fH^o = ?$

Given the standard enthalpy of combustion of benzene $\Delta_cH^o = -3266$ KJ/mol , standard enthalpy of formation of CO_2 (g) $\Delta_fH^o = -393$ KJ/mol and standard enthalpy of formation of H_2O (l) $\Delta_fH^o = -286$ KJ/mol.

YEAR 2023

1 Marks.

1. The enthalpies of all the elements in their standard states are:
(a) Unity (b) zero (c) q = 0 (d) different for each element
2. What is common ion effect?

2 Marks.

1. Calculate the pH OF 0.001M NaOH solution.
2. Derive Gibb's Helmholtz equation.
3. (a) what is adiabatic process?
(b) what is enthalpy of neutralization?

YEAR 2024

1 Marks.

1. A Thermodynamic state function is a quality :
(a) used to determine heat change (b) whose value is independent of path
(c) used to determine pressure – volume work (d) whose value depends on temperature only.

2 Marks.

1. Explain the following :
(a) Free expansion (b) Isolated system.

YEAR 2025

2 Marks.

1. Define enthalpy of neutralization. Enthalpy of neutralization of a strong acid with a strong base is always -57.1KJ, Why?
2. Derive a relation between C_P and C_v , where symbols have their usual meanings.
3.The combustion of one mole of benzene takes place at 298K and 1 atm. After combustion, carbon dioxide and water are produced and 3267.0KJ of heat is liberated. Calculate the standard enthalpy of formation of benzene. Standard enthalpies of formation of carbon dioxide and water are – 393.5KJ/mol and – 285.83 KJ/mol respectively.

Unit – 6 (Equilibrium)

YEAR 2021

2 Marks.

1. Explain law of chemical equilibrium using a general reversible reaction.
2. Calculate the enthalpy of formation of CH_3COOH acid, if its heat of combustion is -867KJ/mol. The enthalpy of for,ation of CO_2 and water are -393.5 and -285KJ/mol respectively.

YEAR 2022

1 Marks.

1. The pH of acid rain is:
(a) 7.5 (b) 4 (c) 5.6 (d) 9.5
2. The pH of 0.001M HCl will be:
(a) 2 (b) 3 (c) 1 (d) 6.

2 Marks.

1. Calculate the standard enthalpy of reaction for the following reaction:

C_2H_4 (g) + $3O_2$ (g) ⟶ $2O_2$ (g) + $2H_2O$ (l)

Given bond enthalpy for:

C-H = 414KJ/mol O=O = 499KJ/mol C=O = 724 KJ/mol O-H = 460 KJ/mol

2. Calculate the pH of 0.01M KOH solution.

3. Examine a reversible reaction:

N_2 (g) + $3H_2$ (g) ⇌ $2NH_3$ (Forward reaction is exothermic and backward reaction is endothermic)

Now answer following questions:

(a) If above reaction is heated then in which direction the equilibrium will shift?

(b) If some more N_2 (g) is added to the above reaction then in which direction the new equilibrium will shift?

4. What is electrochemical series? How it help in finding feasibility of a reaction?

5. What is electrochemical cell? Discuss the working of electrochemical cell with Zn-Cu cell.

YEAR 2023

1 Marks.

1. We know that the relationship between K_p and $K_c = K_c(RT)^{\Delta ng}$. What would be the value of Δng for the reaction:

NH_4Cl (s) ⇌ NH_3 (g) + HCl (g)

(a) 0.5 (b) 1.5 (c) 1 (d) 2

2 Marks.

1. What is le-chatelier principle? Predict the effect of increase in temperature for the reaction

$N_2 + 3H_2 \rightleftharpoons 2NH_3$,ΔH = -92.38KJ.

YEAR 2024

1 Marks.

1. The equilibrium system; CO_2 (g) ⇌ CO_2 (in solution). Is governed by which law?

(a) Kohlrausch's Law (b) Hook's Law (c) Henry's Law (d) Law of chem. Eqbm.

2. Write the equilibrium constant K_c for the equilibrium system:

Ni (s) + 4CO (g) ⇌ $Ni(CO)_4$ (g)

2 Marks.

1. Define Le-Chatelier's principle? Explain the effect of change in pressure and catalyst on an equilibrium.

2. Derive the relation between K_p and K_c for an system:

aA + bB ⇌ cC +Dd

3. Derive the relation between C_p and C_v for an ideal gas.

YEAR 2025

1 Marks.

1. If the value of K_C for the equilibrium 2NOCl (g) ⇌2NO(g) + Cl_2(g) is 9.0 x 10^{-4}mol/L then numerical value of K_c for the equilibrium NOCl (g) ⇌2NO(g) + ½ Cl_2(g) will be :

(a) 4.5 X 10^{-4} (b) 3.0 X 10^{-4} (c) 4.5 X 10^{-2} (d) 3.0 X 10^{-2}

2 Marks.

1. The equilibrium constant for a reaction is 10. What will be the value of ΔG^o?

[use R = 8.314 J/K/mol , T= 300 K and log 10 = 1].

CASE – BASED STUDY

1. A chemist while studying a number of equilibria found that there was a relationship between K_p and K_c. He tested this relation upon various equilibria at different temperatures and the relation was found to be true. He further noticed that for certain equilibria K_p and K_c were equal, however it was not always true.

Based on above study answer the following questions:

(a) Derive the relationship between K_C and K_P. (2)

(b) Uder what condition K_C and K_P are equal? (1)

(c) Write the relation between K_C and K_P for the equilibrium (1)

$2H_2$ (g) + O_2 (g) ⇌$2H_2O$ (g)

Unit – 7 (Redox Reaction)

YEAR 2021

1 Marks.

1. Which of the following may be regarded as a weak electrolyte?
 (a) NaCl (b) HCl (c) CH_3COOH (d) K_2SO_4
2. Oxidation number of Mn in $KMnO_4$ is :
 (a) 6 (b) 7 (c) 8 (d) 5

2 Marks.

1. What is SHE? Explain the construction and working.
2. What is redox reaction? Explain Oxidation.

YEAR 2022

1 Marks.

1. The standard reduction potential of SHE at 298K is:
 (a) 1.00V (b) 0.00V (c) infinite (d) none of these.
2. In Zn-Cu cell, Zn half cell acts as anodic half cell. (True / False).
3. Oxidation number of Cr in $K_2Cr_2O_7$ is……. .
4. Write the full form of SHE.

YEAR 2023

2 Marks.

1. Given the standard electrode potential K^+/K = -2.93V ,Ag^+/Ag = 0.80 V , Hg^{2+}/Hg = 0.79V , Mg^{2+}/Mg = -37V and Cr^{3+}/Cr = -0.74V.
 Arrange these metals in their increasing order of reducing power.

YEAR 2025

1 Marks.

1. When methane is burnt in oxygen to produce carbon dioxide and water , the oxidation number of carbon changes by?
(a) +4 (b) +8 (c) zero (d) +2
2. Define the electrode potential.

2 Marks.

1. Represent the galvanic cell in which the reaction
 $Zn(s) + 2Ag^+(aq) \longrightarrow Zn^{2+}(aq) + 2Ag(s)$ takes place.
2. Balane the redox reaction in acidic solution by ion-electron method:
 $MnO_4^-(aq) + SO_2(g) \longrightarrow Mn^{2+}(aq) + HSO_4^-(aq)$
3. Calculate the oxidation number of phosphorous in orthophosphoric acid (H_3PO_4).

Unit – 8 (Organic Chemistry: Some basic principles and techniques)

YEAR 2021

1 Marks.

1. Two immiscible liquids present in a bottle can be separated by :
 (a) separation funnel (b) steam distillation (c) fractional distillation (d) chromatography
2. Name two immiscible liquids.
3. Define hyperconjugation?

2 Marks.

1. Discuss nucleophile and electrophile.

YEAR 2022

1 Marks.

1. conjugate acid of NH_3 is :
 (a) NH_2^- (b) NH_4^+ (c) N_2 (d) none of these.
2. chemical formula of Heavy water:
 (a) H_2O (b) D_2O (c)) T_2O (d) none of these.
3. Total number of chain isomers formed by C_5H_{12}:
 (a) 2 (b) 3 (c) 4 (d) 1
4. The most stable conformer of butane is :
 (a) Anti (b) Skew (c) Eclipsed (d) Fully Eclipsed.

5. Ether is the functional isomers of :
(a) aldehydes (b) ketones (c) alcohols (d) none of these.
6. The general formula and bond length between carbon in ethylene is :
(a) C_nH_{2n-2} and 1.20 A^o (b) C_nH_{2n} and 1.39 A^o
(c) C_nH_{2n+2} and 1.54 A^o (d) none of these.

2 Marks.

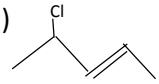
1. Write the IUPAC nomenclature of the following (any two):
(a) CH_3-CH=CH-COOH (b) CH_2=CH-CH_2-OH (c) CH_3-C (CH_3)(OH)-CH_2-CH_3.
2. Differentiate between Inductive effect and Electromeric effect (any four difference).

YEAR 2023

1 Marks.

1. Identify the molecule which do not exist:
(a) C_2 (b) O_2 (c) He_2 (d) Li_2
2. The formula of soda ash is:
(a) $Na_2CO_3.10H_2O$ (b) $Na_2CO_3.2H_2O$ (c) $Na_2CO_3.H_2O$ (d) Na_2CO_3
3. Homolytic fission of a covalent bond leads to the formation of :
(a) Electrophile (b) Nucleophile (c) Free radical (d) Carbocation
4. Identify the compound which exhibits tautomerism:
(a) 2-butene (b) lactic acid (c) 2-pentanone (d) phenol
5. What is inductive effect?
6. What are substitution reaction?

2 Marks.

1. Why are the melting point of alkanes with even number of carbon atom higher than alkenes with odd number of carbon atoms?
2. (a) Write the IUPAC name of the following :
(i) CH_3-CH_2-CH(C_2H_5)-CH_3.
(ii) 

YEAR 2024

1 Marks.

1. Which carbocation is more stable?
(a) $(CH_3)_3C$-C^+H_2 (b) $(CH_3)_3C$-C^+ (c) CH_3-CH_2-CH_2^+ (d) CH_3-CH^+-CH_2CH_3
2. Complete transfer of bonded pair of pi- electrons to one of the atoms joined by a multiple bond on the demand of an attacking reagent, is known as:
(a) Hyper conjugation (b) –I effect (c) +I effect (d) Electronic effect.
3. Define reducing reagent.
4. Write the IUPAC name of the given compound:
CH_3-CH_2-CH(CH_2CH_3)-CH_2-CH(CH_3)-CH_2 -CH_3.

2 Marks.

1. Explain disproportionation reaction and combination reaction?
2. (a) What do you mean by electrophile?
(b) Explain positional isomerism with an example.

YEAR 2025

1 Marks.

1. Which of the following is most stable?
(a) $(CH_3)_3C^+$ (b) $(CH_3)_2CH^+$ (c) $CH_3CH_2^+$ (d) CH_3^+
2. Match the following :

Column A	Column B
(1) Substitution reaction	Ethene + H_2 ⟶ Ethane
(2) Addition reaction	Ethanol ⟶ Ehene + water
(3) Elimination reaction	CH_3Cl +NaOH ⟶ CH_3OH + NaCl
(4) Oxidation reaction	Ethanol ⟶ Ethanoic acid

(a) 1- (ii) , 2 – (i), 3 – (iii) , 4 – (iv)
(b) 1- (iii) , 2 - (i) , 3 – (ii) , 4 – (iv)
(c) 1- (iii) , 2 – (i) , 3 - (iv) , 4 – (ii)
(d) 1- (iv) , 2 – (ii) , 3 – (i) , 4 – (iii)

2. **Assertion :** The conjugate base of a strong acid is a weak base.
Reason : Strong acids completely dissociate in water, leaving their conjugate bases with low tendency to accept protons.
(a) Both (A) and(R) are true, and (R) is the correct explanation of (A).
(b) Both (A) and(R) are true, and (R) is not the correct explanation of (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (A) is true.

3. What is the functional isomer of CH_3OCH_3.

2 Marks.

1. Write a short note on chromatography?
2. Draw Newman's projections of two extreme conformations of ethane. Which conformation is more stable?
3. (a) Give the IUPAC name of:
(i) $CH_3CH(OH)CH=CHCOOH$.
(ii) $CH_3CH(CHO)CH_2CH_2CH(CHO)CH_3$.
4. Draw all the conformers of C_2H_6 and explain which conformer is most stable.

Unit – 9 (Hydrocarbons)

YEAR 2021

1 Marks.

1. How many pi and sigma bonds are in$CH_2=CH-CH_3$?
(a) 1,8 (b) 6,3 (c) 10,1 (d) 8,2
2. $CH_3-CH=CH_2 + HBr \xrightarrow{PEROXIDE} CH_3-CH_2-CH_2-Br$ is an example of :
(a) Markovnikov's rule (b) Anti – Markovnikov's rule
(c) Friedel Crafts Acylation (d) Friedel Craft Alkylation
3. Write chemical equation of wurtz reaction.
4. Write chemical equation of Friedel's craft reaction.

YEAR 2022

1 Marks.

1. The number of sigma and pie bonds in H-C ≡ C-H molecule are:
(a) 3 and 3 (b) 3 and 2 (c) 4 and 1 (d) 2 and 4
2. Carbocations are formed by Homolytic fission. (True / False)
3. …….. is the temporary electron displacement effect involving pie electrons.

2 Marks.

1. Complete the following reaction (any two):
(a) $2C_2H_5-Cl + 2Na\ (s) \xrightarrow{DRY\ ETHER} ?$
(b) $CH_3-CH_2-CH=CH_2 + HBr \xrightarrow{PEROXIDES} ?$
(c) $CH_3CH(Br)CH_2(Br) + 2KOH_{(alc.)} \longrightarrow ?$
5. Starting with potassium succinate , how will you prepare ethyne by electrolysis method?

YEAR 2023

1 Marks.

1. Benzene reacts with acetyl chloride in presence of $AlCl_3$ to give :
(a) Acetophenone (b) Toluene (c) Benzophenone (d) Ethyl benzene
2. How will you convert benzene into chlorobenzene ?
3. What are isomers?

2 Marks.

1. State and explain Markonikov's rule.
2. Complete the reaction:
(a) $CaC_2 + H_2O \longrightarrow ?+?$
(b) $CH_3CH_2OH \xrightarrow{Conc.H2SO4} ?+?$
3. Write a short note on Decarboxylation reaction.

YEAR 2024

1 Marks.

1. Write a short note on β- elimination reaction.
2. How will you convert phenol into benzene.
3. Write a chemical reaction for ozonolysis of propene followed by cleavage with Zn-H_2O.
4. What happens when ethyne is passed over red hot iron at 873K? Write chemical reaction.
5. Benzene reacts with methyl chloride in presence of anhydrous $AlCl_3$ to form:
   (a) Chlorobenzene (b) Benzyl chloride (c) Xylene (d) Toluene.

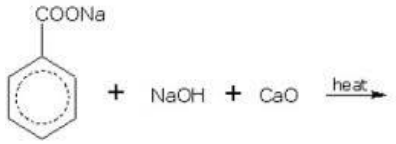
2 Marks.

1. What happens when sodium metal is dropped in water and sodium metal is heated in free supply of air? Write reaction.
2. Complete the reaction:.(a) $CH_2=CH_2 + H_2 \xrightarrow{Pt/Ni/Pd}$?
   (b) Explain wurtz reaction with suitable example.

YEAR 2025

1 Marks.

1. During the chlorination of methane which of the following is not formed at all?
(a) CH_3Cl (b) CH_3CH_3 (c) CH_2Cl_2 (d) CCl_4
2. **Assertion :** Benzene does not readily undergo addition reactions.
   Reason : Benzene has a stable, delocalized pi- electrons system.
(a) Both (A) and(R) are true, and (R) is the correct explanation of (A).
(b) Both (A) and(R) are true, and (R) is not the correct explanation of (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (A) is true.
3. Complete the following reaction:



2 Marks.

1. (a) Alkyl groups act as electron donors when attached to a pi- system, what is this effect called?
   (b) What are nucleophiles?
2. Write a short note on wurtz reaction.
3. How will you prepare 2-bromopropane from 1-bromopropane.