

QUESTION BANK

(Chemistry)

Question Bank for +1 and +2 students for the subject of chemistry is hereby given for the practice. While preparing the questionnaire, emphasis is given on the concepts, short answer-type questions, numerical, naming reactions and conversions, so that it can help students, from the examination point of view.

We hope that you might appreciate this question bank. We welcome suggestions to improve the question bank.

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XI CHEMISTRY

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CLASS - XI
Unit 1 Some basic Concepts of Chemistry

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks

Total = 30 Marks

1. Define law of multiple proportions with example.
2. Calculate the molecular mass of $C_{12}H_{22}O_{11}$
3. Calculate the no. of atoms present in 11.5 litres of H_2 at N.T.P.
4. Calculate the no. of moles of 5.68 gm. of iron.
5. What is the effect of temp. on molality and molarity?
6. An atom of an element is 10.1 times heavier than the mass of a carbon atom. What is its mass in a.m.u.?
7. Explain with example, limiting reagent. 7x1=7
8. Differentiate between molarity and molality.
9. 1.82 g. of glucose (molar mass-180) is dissolved in 25g of water. Calculate (a) the molality (b) mole fraction of glucose and water.
10. The molecular mass of an organic compound is 90 and its %age composition is C-26.6%; O=71.1% and H=2.2%. Determine the molecular formula of the compound.
11. How chemical equations are made more informative?
12. How Avogadro's hypothesis used to deduce atomicity of elementary gases?
13. Verify law of Reciprocal proportions or law of equivalent proportions, with example.
14. Define formula mass and how does it differs from molecular mass? 7x2=14
15. Discuss Dalton's Atomic theory and its limitations?
16. Discuss Modern Atomic theory. Why it is better than Dalton's Atomic theory?
17. Commercially available sulphuric acid contains 91% acid by mass and has a density of 1.83 g mL^{-1} (i) Calculate the molarity of the solution (ii) volume of concentrated acid required to prepare 3.5L of 0.50 M H_2SO_4

Some More Questions :

18. A compound contains 4.07% hydrogen, 24.27% carbon and 71.65% of chlorine. Its molar mass is 98.96g. What are its empirical and molecular formulas?
19. How much copper can be obtained from 110gm of $CuSO_4$?
20. What is Gay Lussac's law? Explain with two examples.
21. What are empirical and molecular formulae? How are they related to each other?
22. Differentiate between normality and molarity?
23. Why molality is preferred over molarity in expressing the concentration of a solution?
24. Explain with the help of an example law of conservation of mass and energy and also the law of constant proportions.

25. Discuss Avogadro's hypothesis.

Unit 2 Structure of Atom

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks Total = 30 Marks

- From the following nuclei select the isotopes and isobars.
 ${}_{92}^{238}\text{U}$, ${}_{90}^{234}\text{Th}$, ${}_{92}^{234}\text{U}$, ${}_{91}^{234}\text{Pa}$, ${}_{93}^{238}\text{Np}$
- What is Zeeman effect and Stark effect?
- Write electronic configurations, of Cr, Cu, Zn?
- Define Aufbau's Principle. Which of the following orbitals are possible.
1 s, 1 p, 2 s, 3 d, 3 f
- Explain Hund's rule of maximum multiplicity by taking an example of phosphorous.
- Why are Bohr's orbits called Stationary States?
- What is the difference between atomic mass and mass number?
- Explain why the uncertainty principle is significant only for the microscopic particles and not for the macroscopic particles?
- Why half-filled and fully filled orbitals are extra stable?
- Why config of 'Cr' is $3d^5 4s^1$ and not $3d^4 4s^2$ and 'Cu' is $3d^{10} 4s^1$ and not $3d^9 4s^2$?
- Give differences between orbit and orbital.
- What is photoelectric effect? What is the effect of frequency and intensity on photoelectric effect?
- Why large no. of lines appear in the spectrum of hydrogen although it contains only one electron?
- Derive de Broglie relationship and give its significance.
- Give important postulates of Bohr's model of an atom.
- Discuss Planck's Quantum theory of Radiation.
- Using the s, p, d, f, notations describe the following quantum no.
(a) $n=1, l=0$ (c) $n=4, l=3$ (d) $n=4, l=2$
(b) $n=3, l=2$ (d) $n=5, l=4$ (e) $n=6, l=4$

Some more questions.

- Discuss important facts about photoelectric effect.
- Discuss black body radiation. Also explain its reason.
- What are emission and absorption spectra? Why dark lines appear in the absorption spectra?

21. What is the frequency and wavelength of a photon emitted during a transition from $n=5$ state to $n=2$ state in the hydrogen atom.
22. Discuss drawbacks of Rutherford's Model.
23. Explain Heisenberg's uncertainty Principle.
24. What do you understand by an atomic orbital? Briefly describe the shapes of s, p & 'd' orbitals?
25. State and explain Aufbau's principle, Pauli's exclusion principle.
26. Explain the properties of cathode rays.
27. How are anode rays produced?
28. Write down the quantum numbers 'n', 'l' and 'm' for the following orbitals.
- (i) $3d_{x^2-y^2}$ (ii) $4d_z^2$ (iii) $3d_{xy}$ (iv) $4d_{xz}$ (v) $2p_z$
- (vi) $3p_x$ (vii) $5f$ (viii) $2p_y$ (ix) $4s$
29. Which of the following sets of quantum numbers are not possible?
- (i) $n = 3, l = 2, m = 0, s = -\frac{1}{2}$
- (ii) $n = 3, l = 2, m = -2, s = -\frac{1}{2}$
- (iii) $n = 3, l = 3, m = -3, s = +\frac{1}{2}$
- (iv) $n = 3, l = 1, m = 0, s = +\frac{1}{2}$
30. Which of the following orbitals are not possible?
 1p, 2s, 2p, 3f, 3d, 4f, 4d

Unit 3 Classification of Elements

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks Total = 30 Marks

1. What are magic numbers?
2. Give Modern periodic law.
3. What are Dobereiner's triads?
4. Give general electronic configuration of 'd'-block and 'f'-block elements.
5. What are the defects of long form of the periodic table?
6. What is the cause of periodicity?
7. What are successive ionization enthalpies?
8. Why Ionization enthalpy of 'Be' is more than 'B' and of 'N' is more than 'O' explain?
9. Why electron gain enthalpies of Noble gases are positive while those of 'Mg' and 'P' are almost zero?
10. Why electron gain enthalpy of flourine is less negative than that of chlorine?
11. What are iso electronic species? How are their sizes vary in iso electronic series?
12. Which of the following will have the largest and smallest size and why?
 Cl, Cl^{-1}, Al, Al^{3+}
13. Why d- and f-block elements are less electropositive than group 1 and 2 elements?
14. What is diagonal relationship? Explain it with the help of 'Be' and 'Al'.
15. What is ionisation enthalpy? On what factors it depends?
16. What is electron gain enthalpy? On what factors it depends. How it varies in a group and in a period?
17. How will you justify presence of 18 elements in 5th period and presence of 32 elements in 6th period?

Unit 4 Chemical Bonding and Molecular Structure

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks Total = 30 Marks

1. Why do atoms combine?
2. What is the significance of Lewis Symbols?
3. Give structure of BrF_5
4. Why H_2O is liquid and H_2S is a gas?
5. Why NH_3 is liquid and PH_3 is a gas?
6. Boiling point of p-nitrophenol is more than O-nitrophenol why?
7. How is paramagnetic character of a compound is related to the no. of unpaired electrons?

8. Describe a co-ordinate bond with an example. How does it differ from a covalent bond?
9. How is MgF_2 and Al_2O_3 formed?
10. What is an Octet rule? What are its limitations?
11. Which out of NH_3 and NF_3 has higher dipole moment and why?
12. Draw molecular orbital diagram for N_2^+ molecule.
13. HCl is a covalent compound but it ionises in the solution?
14. The molecule of CO_2 is linear whereas that of SnCl_2 is angular why?
15. Give molecular orbital energy level diagram of CO . Write its electronic configuration, magnetic behaviour and bond order.
16. How is ionic bond formed? On what factors it depends?
17. Calculate the lattice enthalpy of KCl from the following data by Born-Haber's Cycle.
 Enthalpy of sublimation of $\text{K} = 89 \text{ KJ mol}^{-1}$
 Enthalpy of dissociation of $\text{Cl}_2 = 244 \text{ KJ mol}^{-1}$
 Ionization enthalpy of potassium = 425 KJ mol^{-1}
 Electron gain enthalpy of chlorine = -355 KJ mol^{-1}
 Enthalpy of formation of $\text{KCl} = -438 \text{ KJ mol}^{-1}$

More questions

18. How do atoms combine? Describe briefly.
19. Give characteristics of ionic compounds.
20. How is covalent bond formed discuss with the help of N_2 , CH_4 , C_2H_2 ?
21. Give postulates of VSEPR theory.
22. Discuss types of covalent bonds with the help of example. Why pi-bond can't exist independently?
23. Discuss the factors affecting bond enthalpy
24. Discuss the partial ionic character of covalent bond by taking an example.
25. Give applications of dipole moment.
26. Discuss partial covalent character of ionic bonds.
27. What is hybridisation? Discuss facts about hybridisation.
28. Give salient features of Molecular orbital theory.
29. Differentiate between bonding and anti bonding molecular orbitals.
30. Discuss the conditions for the combination of atomic orbitals to form molecular orbitals.
31. What are the consequences of hydrogen bonding?
32. Discuss types and conditions for hydrogen bonding.
33. Why density of water is maximum at 277K ? Discuss.
34. Why KHF_2 exists while KHCl_2 does not?
35. Which is more polar and why, CO_2 or N_2O ?

Unit 5 Hydrogen

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks Total = 30 Marks

1. What are nuclear spin isomers of Hydrogen?
2. Why is dihydrogen not preferred in balloons?
3. Phosphorus forms only PH_3 and not PH_5 why?
4. How is temporary hardness of water removed?
5. Write the names of isotopes of hydrogen. What is the mass ratio of these isotopes?
6. What are electron deficient and electron rich compounds of hydrogen? Give examples.
7. Is distilled water useful for drinking purpose? If not, how can it be made useful?
8. What is autoprotolysis of water? What is its significance?
9. How does H_2O_2 behave as a bleaching agent?
10. What properties of water make it useful as a solvent? What types of compound can it dissolve and hydrolyse?
11. What do you understand by terms hydrolysis and hydration? Give examples.
12. What do you understand by term hydrogen economy?
13. H_2O_2 act both as oxidising and reducing agent, Justify it with the help of examples.
14. (i) How does H_2O_2 reacts with KMnO_4 in alkaline medium?
(ii) How does H_2O_2 reacts with $\text{K}_2\text{Cr}_2\text{O}_7$ in acidic medium?
15. Give uses of heavy water. Can heavy water be used for drinking?
16. (i) How water act both as an oxidising and reducing agent? Give examples.
(ii) What is coal gasification?
17. How does hydrogen resembles halogens and alkali metals and how it differs from them.

Unit 6 S-Block Elements Alkali Metals

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks Total = 30 Marks

1. What is the cause of diagonal relationship?
2. Alkali metals have the lowest ionisation enthalpy in each period. Why?
3. The second ionisation enthalpies of alkali metals are very high?
4. All the alkali metals impart characteristic colour to flame. Why?
5. Alkali metals show photoelectric effect. Why?
6. Cesium show photoelectric effect to the maximum extent. Why?
7. Why alkali metals are soft and have low m.pt and b.pt.?
8. Alkali metals are very reactive. Justify with the help of examples.
9. Alkali metals are kept in kerosene oil why?
10. When alkali metals dissolves in liquid ammonia, the solution can acquire different colours. Explain the reason.

11. Why lithium shows anomalous behaviour?
12. Why lithium is the strongest reducing agent where as its ionization enthalpy is highest?
13. What is polarisation discuss it by taking example of lithium?
14. The hydroxides of alkali metals are strongly basic why?
15. How is sodium carbonate prepared by Solvay process?
16. How is sodium hydroxide prepared by Castner Kellner cell?
17. (i) Can we store sodium in water or not? Why.
(ii) Write balanced equations for the following
(a) Na_2O_2 and H_2O (b) KO_2 and H_2O
18. LiH is more stable than NaH. Explain.

Unit 6 S-Block Elements Alkali Earth Metals

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks Total = 30 Marks

1. Although IE_1 values of alkaline earth metals are higher than those of alkali metals, the IE_2 values of alkaline earth metals are much smaller than those of alkali metals why?
2. Calcium and strontium give characteristic colour to the flame but beryllium and magnesium do not give any characteristic flame colours. Why?
3. Hydration enthalpies of alkaline earth metals are larger than those of the corresponding alkali metals. Why?
4. Why beryllium and magnesium form complexes?
5. The hydroxides of alkaline earth metals are less basic than alkali metals of the corresponding periods. Why?
6. What is cement? What is its composition?
7. What is dead burnt plaster? How is it obtained?
8. (i) BeCl_2 can be easily hydrolysed why?
(ii) What is the difference between quick lime, Slaked lime and lime water?
9. (i) Why are halides of beryllium polymeric?
(ii) Explain why can alkali and alkaline earth metals not be obtained by chemical reduction methods?
10. What happens when
(i) 'Mg' is burnt in air. (ii) Quick lime is heated with silica
(iii) Chlorine reacts with Slaked lime. (iv) Calcium nitrate is heated.
11. Why does the solubility of alkaline earth metal carbonates and sulphates decrease down the group?
12. Why does solubility of alkaline earth metal hydroxides increase down the group?
13. (i) What is hydrolith?
(ii) Which out of Mg^{2+} , Ba^{2+} , Ca^{2+} has maximum ionic mobility in water and why?

14. How does quick lime reacts with water, carbon dioxide and phosphorous pentaoxide.
15. How is lime stone manufactured and how it reacts with HCl and H₂SO₄?
16. Discuss chemical properties of Slaked lime.
17. How beryllium behaves differently as compare to magnesium or compare physical and chemical properties of beryllium and calcium.

Unit 7 Organic Chemistry : Some basic Principles and Techniques

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks Total = 30 Marks

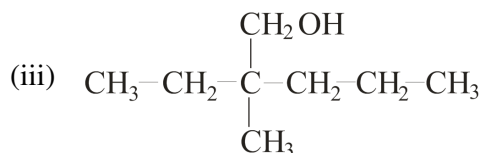
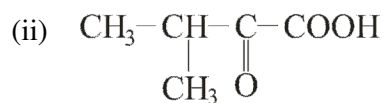
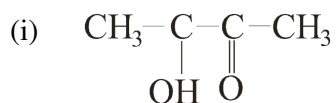
1. What is catenation?
2. What are homocyclic and heterocyclic compounds? Give examples.
3. What is a homologous series?
4. Define structural isomerism. Give structural isomers of butane.
5. Explain metamerism with example.
6. What is tautomerism? Give example.
7. Give all possible isomers of Hexane.
8. What is positive and negative inductive effect? Give examples.
9. What is electromeric effect? Discuss it with the help of an example.
10. Give resonating structures of C₆H₅NH₂ molecule.
11. What is homolytic and heterolytic fission?
12. What are free radicals? Which is the most stable free radical and why?
13. What is carbocation? Why tertiary carbocation is most stable?
14. What is carbanion? Which is the most reactive carbanion and why?
15. What are electrophiles and nucleophiles and what are their types? Discuss in detail.
16. What is resonance effect? Discuss positive and negative (+R; -R) effect with example.
17. What is hyperconjugation? Give applications of hyperconjugation.

Or

Discuss Addition reaction and Elimination reaction in detail.

Or

Give IUPAC Name of the following:



Unit 8 States of Matter

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks Total = 30 Marks

1. How is the pressure of a gas related to its density at a particular temperature?
2. A gas occupies 180 mL at a pressure of 0.740 bar at 20°C. How much volume will it occupy when it is subjected to external pressure of 1.025 bar at the same temp.?
3. A sample of gas occupies 2.50 L at 25°C. If the temp is raised to 65°C, what is the new volume of the gas if pressure remains constant?
4. Give physical significance of Gay Lussac's Law in daily life.
5. How is gas constant 'R' related to work?
6. Why drop of a liquid is spherical in shape?
7. What is laminar flow?
8. Derive Ideal gas equation.
9. CO₂ is heavier than N₂ and O₂ gases present in the air but it does not form the lower layer of the atmosphere. Explain?
10. What is an ideal gas? Why do real gases deviate from ideal behaviour?
11. Will water boil at higher temp at Sea level or at the top of mountains and why?
12. Why does the temp. of the boiling liquid remains constant even though heating is continued?
13. Calculate the temp. of 5.5 moles of a gas occupying 6 dm³ at 3.35 bar (R=0.083 bar dm³ k⁻¹ mol⁻¹)
14. The drain cleaner contains small bits of aluminium, which react with caustic soda to produce H₂ gas. What volume of H₂ gas at 20°C and one bar pressure will be released when 0.15 gm of 'Al' reacts?
15. Give various postulates of kinetic molecular theory of gases and also give its justification.
16. What is liquefaction of a gas? Discuss Andrew's isotherms for CO₂ and important conclusions.
17. According to kinetic theory, the forces of attraction between the gas molecules are negligible. Discuss it.

More questions :

18. Why mercury is used as a liquid in a barometer? Explain.
19. A one litre flask contain helium gas and 1.5 litre flask contains xenon gas at the same temp and pressure. What is the ratio of number of atoms in the two flasks?
20. How will you determine pressure of a dry gas by using Dalton's law of partial pressures?
21. Differentiate between diffusion and effusion. What is the cause of diffusion?
22. Two gases A & B having same volume diffuse through a porous partition in 30 secs. and 20 secs. respectively. The molecular mass of A is 45. Find the molecular mass of B.

23. Calculate the volume of oxygen that will diffuse in the same time as 50 ml of SO₂.
24. Discuss the factors on which vapour pressure depends.
25. What is the effect of temp. and pressure on surface tension and viscosity?
26. Discuss dipole – induced dipole forces with example.
27. Give characteristics of London forces.
28. Why CO₂ and NH₃ can be liquefied easily where as H₂, O₂ and N₂ cannot be liquefied.
29. Which out of the following will have higher vapour pressure at a given temp. and why? (a) Polar liquids like water (b) Non-Polar liquids like ether.
30. Why do gases deviate from ideal behaviour?
31. Compare the properties of solids, liquids and gases.
32. Why do ionic compds have higher m.pt. ?

Unit 9 Thermodynamics

One mark questions.

1. What is meant by extensive and intensive properties?
2. What is meant by State function and path function?
3. What is a perpetual motion machine? Is it possible?
4. Express the change in internal energy of a system when 'W' amount of work is done by the system and 'q' amount of heat is supplied to the system. What type of system would it be?
5. A system absorbs energy equivalent to 415 J and performs work equivalent to 205.15J. Calculate the change in internal energy of the system.
6. Why it is necessary to define the standard state?
7. Why does a real crystal has more entropy than an ideal crystal?

Two mark questions.

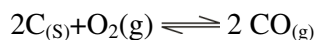
8. Is decrease in enthalpy the only criterion for spontaneity? Justify with example.
9. Is tendency towards maximum randomness the sole criterion for spontaneity? Justify with example.
10. Justify Hess's law of constant heat Summation with suitable example.
11. Absolute value of internal energy cannot be determined. Explain?
12. Ethanoic acid and hydrochloric acid react with sodium hydroxide solution. The enthalpy of neutralisation of ethanoic acid is -55.8 KJ mol⁻¹ while that of hydrochloric acid is -57.3 KJ mol⁻¹. Can you think of the difference?
13. Predict the enthalpy change, free energy change and entropy change when ammonium chloride is dissolved in water and the solution becomes colder.
14. Discuss the effect of temperature on the spontaneity of an exothermic and endothermic reaction.

Three marks questions.

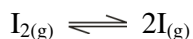
15. (i) Absolute value of internal energy cannot be determined. Explain.
(ii) When ΔG is positive, the process is always non spontaneous. Explain.
16. (i) Explain the meaning of driving force of a chemical reaction. How is ΔG related to ΔH and ΔS in a reaction?
(ii) How does $T\Delta S$ determine the spontaneity of a process?
17. (i) How will you justify that both 'q' and 'w' are not state functions, yet (q+w) is a state function?
(ii) ΔH is negative for exothermic reaction and positive for endothermic reaction. Explain.
18. For a reaction both ΔH and ΔS are positive. Under what conditions will the reaction be spontaneous?
19. Determine ΔH_r° at 298 K for the reaction.
 $C(\text{graphite}) + 2H_{2(g)} \rightarrow CH_{4(g)}$; $\Delta H_r^\circ = ?$
you are given
- (i) $C(\text{graphite}) + O_{2(g)} \rightarrow CO_{2(g)}$ $\Delta H_r^\circ = -393.5 \text{ KJ mol}^{-1}$
(ii) $H_{2(g)} + \frac{1}{2} O_{2(g)} \rightarrow H_2O_{(l)}$ $\Delta H_r^\circ = -285.8 \text{ KJ mol}^{-1}$
(iii) $CO_{2(g)} + 2H_2O_{(l)} \rightarrow CH_{4(g)} + 2O_{2(g)}$; $\Delta H_r^\circ = +890.3 \text{ KJ mol}^{-1}$
20. Predict the feasibility of a reaction when both ΔH and ΔS are negative.
21. For the reaction $A_{(g)} + 3B_{(g)} \rightarrow 2C_{(g)}$, the enthalpy change is $-90.2 \text{ KJ mol}^{-1}$ and ΔS is $-0.1584 \text{ KJ K}^{-1} \text{ mol}^{-1}$. Predict whether the reaction is feasible or not at 298 K?
22. Enthalpy and entropy changes of a reaction are $49.57 \text{ KJ mol}^{-1}$ and $123.2 \text{ J K}^{-1} \text{ mol}^{-1}$. Calculate the free energy change of the reaction at 27°C .
24. Give reason why heat of neutralization less than 57.1 KJ mol^{-1} when 0.1N Solution of acetic acid is neutralized by 0.1 N NaOH solution?

Unit 10 Equilibrium**Total = 30 Marks****One mark questions :**

1. What do you mean by homogenous and heterogenous equilibria?
2. Write the expression for the equilibrium constant 'K' for each of the following reaction.
- (i) $2 \text{NOCl}_{(g)} \rightleftharpoons 2 \text{NO}_{(g)} + \text{Cl}_{2(g)}$
(ii) $C_{(s)} + \text{CO}_{2(g)} \rightleftharpoons 2\text{CO}_{(g)}$
3. (i) $I_2(S) + 5F_{2(g)} \rightleftharpoons 2\text{IF}_5$ write 'K'
(ii) $\text{FeO}_{(s)} + \text{CO}_{(g)} \rightleftharpoons \text{Fe}(S) + \text{CO}_{2(g)}$ write 'K'.
4. What is the effect of reducing the volume on the system in equilibrium represented below :



5. What is the effect of increase of temperature on equilibrium constant for the following reaction.



6. The equilibrium constant expression for a gaseous reaction is $K_c = \frac{[NH_3]^4 [O_2]^5}{[NO]^4 [H_2O]^6}$
write the balanced chemical equation corresponding to this expression.
7. What are conjugate acid-base pairs? Give an example.

Two marks questions.

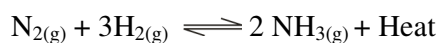
8. Give limitations of Arrhenius concept of Acids and bases.
9. Give advantages of Bronsted-Lowry concept over Arrhenius concept.
10. (i) What will be the conjugate bases for the following Bronsted acids?
HF, H₂SO₄, HCO₃⁻, H₃PO₄
- (ii) What will be the conjugate acids for the following Bronsted bases?
NH₂⁻, NH₃, HCOO⁻, ClO₄⁻
11. Why PO₄³⁻ ion is not amphiprotic?
12. What is a buffer solution? Ammonium acetate is a buffer where as sodium chloride is not. Why?
13. What are acidic buffers? Explain with the help of an example.
14. What are basic buffers? Explain with the help of an example.

Three marks questions.

15. (i) Derive an expression for the calculation of the degree of ionization of a weak electrolyte.
- (ii) Why is ammonia termed as lewis base? Illustrate with two examples.
16. (i) Addition of a drop of HCl to an acidic buffer of acetic acid and sodium acetate does not produce any appreciable change in the pH of the solution. Why?
- (ii) A chemical equilibrium is dynamic in nature. Explain.
17. What do you mean by strength of an acid? How can the strength of the two acids be compared?

More questions.

18. What are the important characteristics of chemical equilibrium?
19. What is the difference between amphoteric and amphiprotic?
20. Using Le-chatelier's principle, predict the effect of (a) decreasing the temperature (b) increasing the pressure on the following system.



21. The dissociation constant of NH₄OH at 298 K is 1.8x10⁻⁵. Calculate the degree of dissociation of 0.01 M Sol. of NH₄Cl. K_w at 298 K = 10⁻¹⁴

22. Calculate the hydrolysis constant of the salt containing NO_2^- ions. K_a for $\text{HNO}_2 = 4.5 \times 10^{-10}$
23. Determine the degree of hydrolysis at 0.10 M solution of sodium acetate at 298 K. (K_a for $\text{CH}_3\text{COOH} = 1.8 \times 10^{-5}$ & $K_w = 1 \times 10^{-14}$). Also calculate hydrolysis constant and pH.
24. The aqueous sol. of all Salts of weak acids and strong bases are alkaline. Justify it with the help of an example.
25. The aqueous sol. of all Salts of weak bases and strong acids are acidic. Justify it with the help of an example.
26. All Arrhenius acids are Bronsted-Lowry acids but all Arrhenius bases are not Bronsted-Lowry bases. Justify this statement with example.

Unit 11 Redox Reactions

Total = 30 Marks

One mark questions :

1. Calculate the oxidation number of Mn in KMnO_4 and 'Cr' in $\text{K}_2\text{Cr}_2\text{O}_7$.
2. Identify the oxidant and reductant in the following reactions.
 - (i) $2\text{Zn}_{(s)} + \text{O}_{2(g)} \rightarrow 2\text{ZnO}_{(s)}$
 - (ii) $\text{I}_{2(g)} + \text{H}_2\text{S}_{(g)} \rightarrow 2\text{HI}_{(g)} + \text{S}_{(s)}$
3. Which elements always have positive oxidation state?
4. What is the function of salt bridge?
5. Give applications of electrochemical series.
6. What are direct and indirect redox reactions?
7. Oxidation and reduction go side by side in a redox reaction. Justify it.

Two marks questions:

8.
 - (i) Why are redox reactions called electron transfer reaction?
 - (ii) Can the same element have different oxidation numbers in different compounds? Justify.
9.
 - (i) What happens when a zinc rod is dipped in a copper sulphate solution?
 - (ii) What are combination redox reactions and decomposition redox reactions? Give examples.
10. H_2S acts as a reducing agent while SO_2 acts as an oxidising as well as reducing agent. Explain.
11. Give important features of Half-cell reactions.
12. HNO_3 acts as an oxidising agent while HNO_2 can act both as a reducing agent as well as oxidising agent explain.
13. Give differences between oxidation no. and valency.

14. Are all decomposition reactions redox reactions? Comment.

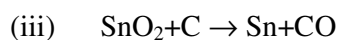
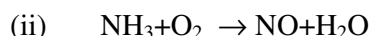
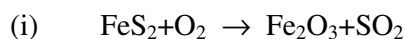
Three marks questions :

15. What do you understand by metal displacement redox reactions? How these differ from non-metal displacement reactions?

16. (i) What would happen if no salt bridge is used in $\text{ZnSO}_4 - \text{CuSO}_4$ electrochemical cell?

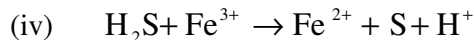
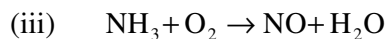
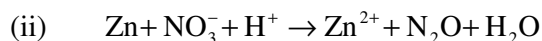
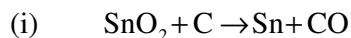
(ii) What happens when copper rod is dipped in AgNO_3 Solution?

17. Mention oxidation, reduction, oxidising agent and reducing agent in the following reactions.

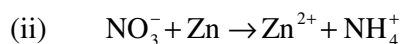


More questions :

18. Balance following equations by oxidation no. method.



19. Balance following equations by Ion-Electron method.



20. Give differences between Electrochemical cell and Electrolytic cell.

21. What are disproportionation redox reaction? Give example.

22. Give limitations of concept of oxidation number.

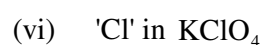
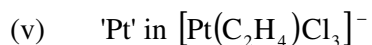
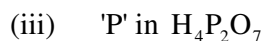
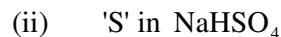
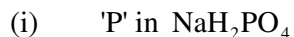
23. Give advantage of electron density concept over oxidation no. concept.

24. Discuss the role of redox titrations in volumetric titrations.

25. Chlorine, bromine and iodine disproportionate in alkaline medium but fluorine does not. Why?

26. Give an important application of non-metal displacement redox reactions in qualitative mixture analysis.

27. Assign oxidation no. of the followings :



Unit 12 *p*-Block Elements Boron. Family

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks

Total = 30 Marks

1. Why atomic radii of 'Ga' is smaller than 'Al'?
2. BCl_3 is known but TlCl_3 is not known. Why?
3. The metallic character increases from boron to aluminium and then decreases from aluminium to thallium. Explain.
4. Boron is a non-metal where as 'Al' is a metal. Why?
5. What is inert pair effect?
6. The reducing character of elements of gr. 13 goes on decreasing down the group. Why?
7. BCl_3 acts as a lewis acid. How?
8. Discuss structure of diborane.
9. Why BCl_3 is a stronger lewis acid than BF_3 ?
10. BCl_3 exists as a monomer where as AlCl_3 exists as a dimer why?
11. Borazine is more reactive than benzene. Why?
12. Why alumina cannot be reduced by Carbon?
13. Why anhydrous aluminium chloride has a lower melting point than anhydrous aluminium flouride?
14. Why boron and thallium does not form B^{3+} and Tl^{3+} ions?
15. (i) Why ionisation enthalpy of 'Ga' is higher than that of 'Al'?
(ii) Thallous compounds (Tl^+) are more stable than thallic (Tl^{3+}) compounds. Why?
16. Boron and Silicon are diagonally related to each other. Give chemical reactions to prove this.
17. (i) What is thermite welding?
(ii) Why B-F bond length in BF_3 is Smaller than the expected value?
(iii) BF_3 is not hydrolysed where as BCl_3 get easily hydrolysed. Explain.

Unit 12 *p*-Block Elements The Carbon-Family

One mark questions:

1. Tin and lead show '+2' and '+4' oxidation states but for lead compounds +2 oxidation state is more stable. Why?
2. $[\text{SiF}_6]^{2-}$ is possible where as $[\text{CF}_6]^{2-}$ is not possible. Why?
3. Which allotropes of Carbon acts as an abrasive and which as a lubricant?
4. Why is diamond denser than graphite?
5. What are Silicones?
6. Diamond is covalent, yet it has high melting point. Why?
7. $[\text{SiF}_6]^{2-}$ is known but $[\text{SiCl}_6]^{2-}$ is not. Give reason.

Two mark questions.

- Why does carbon not form either C^{4+} or C^{4-} ions?
- Give the differences in structures of the following pair of compounds: CO_2 and SiO_2 .
- Why $N(CH_3)_3$ is Pyramidal but $N(SiH_3)_3$ is planar?
- Why elemental Silicon does not form a graphite like structure, as carbon does?
- Give Chemical reaction to show that Tin (II) is a reducing agent, whereas, lead (II) is not.
- Why milkiness disappears when excess of CO_2 gas is passed through lime water?
- The ionization enthalpy of lead is more than tin. Why?

Three marks questions.

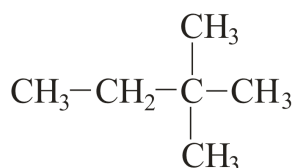
- Why CO_2 has no net dipole moment? 1½
 - Carbon forms covalent compounds whereas lead forms ionic compounds. Why? 1½
- Why BCl_3 and CCl_4 behave differently towards water?
 - What are Silicates?
- Write a short note on fullerenes.

Unit 13 Hydrocarbons Alkanes & Alkenes

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks

Total = 30 Marks

- What are Saturated and unsaturated hydrocarbons?
- How are alkanes prepared by Grignard's reagent?
- Give mechanism of Wurtz reaction.
- How will you convert acetaldehyde to ethane and acetone to propane?
- Boiling points of isomeric alkanes goes on decreasing with increased branching. Why?
- Alkanes with even no. of carbon atoms have high melting point as compare to alkanes with odd no. of carbon atoms why?
- Give mechanism of sulphonation of alkanes?
- n*-pentane has higher boiling point than neo pentane. Explain.
- Mention primary, secondary and tertiary carbons and hydrogens in the following compound.



10. Eclipsed conformation is less stable than staggered conformation of ethane. Explain.
11. What is geometrical isomerism and what is its cause?
12. What are the necessary conditions for the geometrical isomerisation?
13. How are alkenes prepared by Kolbe's Electrolytic process?
14. Why alkenes undergo electrophilic addition and not electrophilic substitution reaction?
15. (i) Explain and Justify Markownikoff's rule.
(ii) Give mechanism of Kharash effect.
16. (i) Give ozonolysis reaction of ethene.
(ii) How is structure of alkene elucidated by ozonolysis ?
17. (i) What is lindlar's catalyst? What is its use?
(ii) Cis alkenes show higher boiling point as compared to trans-isomer. Why?

Unit 13 Hydrocarbons

Alkenes and Alkynes

Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks

Total = 30 Marks

1. How will you prepare acetylene from calcium carbide?
2. Discuss Kolbe's electrolytic method to prepare acetylene.
3. Convert Chloroform into acetylene.
4. Convert methane into acetylene.
5. Alkynes do not exhibit geometrical isomerism while alkenes do so why?
6. Alkynes are less reactive than alkenes towards electrophilic addition reaction why?
7. Convert acetylene into ethanol.
8. Why does acetylene behave like a weak acid?
9. Write two reactions to show acidic nature of acetylene.
10. What is peroxide effect? Why is it applicable only in case of addition of HBr and not in case of HCl and HI?
11. Alkynes undergo both electrophilic and nucleophilic addition reactions. Why?
12. Discuss structure of alkyne.
13. Alkynes are acidic in nature. Explain.
14. Give reaction for the detection of terminal alkynes.
15. (i) Give mechanism of addition of halogens to alkynes.
(ii) Why alkynes undergo nucleophilic addition reactions while simple alkenes do not?
16. (i) How will you convert acetylene into oxalic acid?
(ii) How will you convert propyne into ethanoic acid?
(iii) How will you convert acetylene into acrylic acid?
17. (i) How will you distinguish between Ethane and Ethyne? Give reaction.
(ii) How will you distinguish between Ethene and Ethyne? Give reaction.

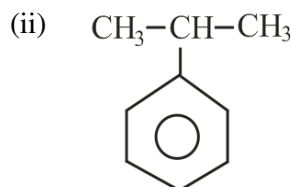
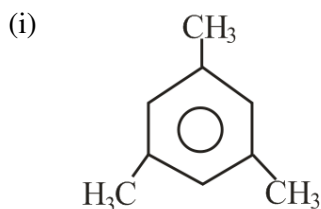
- (iii) How will you distinguish between propane and cyclopropane ? Give reaction.

Unit 13 Hydrocarbons Benzene

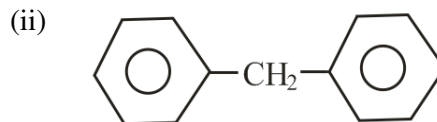
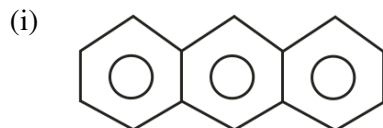
Q.No.1-7 : 1 Mark, 8-14 = 2 Marks, and 15-17 = 3 Marks

Total = 30 Marks

1. What are aromatic hydrocarbons?
2. Give IUPAC names of the following compounds.



3.



4. What is aromaticity?
5. How will you convert n-hexane to benzene?
6. How will you convert benzene to benzoic acid?
7. How will you convert benzene to benzaldehyde?
8. What are activating groups? Explain it with example.
9. Give mechanism of nitration of chlorobenzene.
10. What are electron withdrawing groups? Why are they meta-directing?
11. Give mechanism of chlorination of Nitrobenzene.
12. Give mechanism of Friedal-craft acylation reaction.
13. (i) How will you convert benzene to benzophenone?
(ii) How will you convert benzene to acetophenone?
14. Give mechanism of Sulphonation of benzene.
15. (i) Give mechanism of nitration of benzene.
(ii) How will you prepare benzene from diene's?
16. How is structure of benzene deduced? Discuss in detail.
17. Discuss evidences in favour of resonating structure of benzene.
18. Why does benzene undergo electrophilic substitutions reactions easily and nucleophilic substitutions with difficulty?
19. How would you convert following compounds into benzene?
(i) Ethyne (ii) Ethene (iii) Hexane

20. Arrange benzene, n-hexane and ethyne in decreasing order of acidic behaviour. Also give reasons.
21. Out of benzene, m-dinitrobenzene and toluene which will undergo nitration most easily and why?
22. Although benzene is highly unsaturated yet it does not prefer to undergo addition reactions. Explain.
23. Why is benzene extra ordinarily stable though it contains three double bonds?
24. What are the necessary conditions for any system to be aromatic?

Unit 14 Environmental Chemistry

Total 30 marks

One mark questions

1. List gases which are responsible for green house effect.
2. What is Smog?
3. How is classical smog different from Photochemical Smog?
4. Give one advantage and one disadvantage of ozone in the atmosphere.
5. What is meant by term 'Sink' and target with respect to pollution?
6. How plant nutrients and pesticides act as water pollutants?
7. What are polynuclear aromatic hydrocarbons (PAH)?

Two mark questions.

8. What are the harmful effects of PAH?
9. How NO_x pollution can be controlled? Explain.
10. (i) How lead halides enter into atmosphere as pollutants?
(ii) How do contaminants differ from pollutants?
11. What are the primary and secondary pollutants of the air?
12. What is chemical oxygen demand? Explain.
13. What is biochemical oxygen demand? Explain.
14. What is meant by inversion temperature in different regions of the atmosphere?

Three mark questions.

15. Chlorine radical plays an important role in the destruction of ozone. Explain.
16. CO_2 is inert and harmless gas, yet it is thought to be a serious pollutant. Explain.
17. What are the reactions involved for ozone layer depletion in the stratosphere?

Some more questions.

18. Write down the reactions involved during the formation of Photochemical Smog.
19. Explain tropospheric pollution.
20. What are the harmful effects of photochemical Smog and how can they be controlled?
21. What do you mean by green chemistry? How will it help in decreasing environmental pollution?
22. How can domestic waste be used as manure?
23. What is acid rain? Give some of its harmful effects?
24. What is incineration? Explain.
25. Name and explain any four methods of waste management.

XII CHEMISTRY

INDEX

Chapters	Name of the Chapter
1.	Solid State
2.	Solutions
3.	Electro Chemistry
4.	Chemical-Kinetics
5.	Surface Chemistry
6.	General Principles and Processes of Isolation of Elements
7.	p-Block Elements
8.	d-and f-Block Elements
9.	Co-ordination Compounds
10.	Haloalkanes and Haloarenes
11.	Alcohols, Phenols and Ethers
12.	Aldehyde, Ketones and Carboxylic Acids
13.	Organic Compounds Containing Nitrogen
14.	Bio-molecules
15.	Polymers
16.	Chemistry in Everyday Life

Class - XII

Unit – 1 (Solid State)

1 mark questions

1. Why amorphous solids are called pseudo solids or super cooled liquids?
2. Why crystalline solids are anisotropic?
3. How many tetrahedral and octahedral voids are there for each sphere?
4. What is radius ratio?
5. How ionic solid can be distinguished from a metallic solid?
6. What are F-centres?
7. What will happen to conductivity of metals and semiconductors, when there is increase in temp.?

2 marks questions

8. What is Schottky defect? What is its effect on the density of crystal?
9. What is the radius ratio for cation and anion to occupy tetrahedral sites?
10. Differentiate schottky and Frenkel defect.
11. What is the difference between n-type and p-type semiconductors? Give one example of each.
12. Why some minerals of iron pyrites are called fool's Gold?
13. Define ferromagnetism and Ferrimagnetism and show alignment of their magnetic moments.
14. Explain the term 'unit cell' and 'crystal lattice'.

3 marks questions

15. Analysis shows that a metal oxide has the empirical formula $M_{0.98} O_{1.00}$. Calculate the percentage of M^{2+} and M^{3+} ions in the crystal.
16. What is disorder or imperfection? Explain any two types of imperfections in solids.
17. An element crystallizes in bcc structure. If edge length of cell is 1.469×10^{-8} cm and density 19.3g/cm^3 , then calculate the atomic mass of the element.

Class - XII

Unit – 2 (Solutions)

(1 mark questions)

1. In deep sea diving, why the condition "the bends" occur?
2. How is the molarity different from the normality?
3. Why molality is considered better for expressing the concentration as compared to molarity?
4. Why "Anoxia" occurs at high altitudes?
5. What is the similarity between Raoult's law and Henry's Law.
6. What are azeotropes?
7. What are anti-freeze solutions? Give one example.

(2 marks questions)

8. Why common salt is used to clear the snow on the roads?
9. How plasmolysis is different from hemolysis?
10. What is Van't Hoff factor? Give its value for solutes undergoing association and dissociation in solution.
11. What is Henry's law? Give its 2 limitations.
12. Differentiate Ideal and Non-ideal solutions.
13. What is relative lowering in vapour pressure? Which out of lowering in V.P. and relative lowering in V.P, is a colligative property?
14. What happened to peeled egg when dipped in water? Explain.

(3 marks questions)

15. How elevation in boiling point is a colligative property? Explain.
16. Addition of 1.286 gm of a compound to 100 ml. of benzene (density 0.879 g/ml) lowers the freezing point from 5.51°C to 5.03°C. If K_f for benzene is 5.12 K kg/mol, calculate the molar mass of the compound?
17. Non-ideal solutions show positive and negative deviations from Raoult's law. What are these deviations and why they are caused?

Class - XII

Unit – 3 (Electro chemistry)

(1 mark questions)

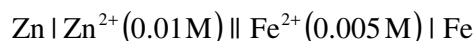
1. What happens to the electrical conductance of electrolytic conductor and metallic conductor, with increase in temp.
2. What is salt bridge? Give its two functions.
3. Calculate the cell potential for the cell :
 $\text{Mg(s)} | \text{Mg}^{2+} (0.1 \text{ M}) || \text{Cu}^{2+} (1 \times 10^{-3} \text{ M}) | \text{Cu(s)}$
Given $E^\circ (\text{Cu}^{2+}/\text{Cu}) = +0.34 \text{ V}$, $E^\circ (\text{Mg}^{2+}/\text{Mg}) = -2.37 \text{ V}$
4. Why dry cell does not have an indefinite life?
5. Why primary batteries or cells are not chargeable?
6. Name the cell which were used in Apollo space programme.
7. What is the chemical formula of rust?

(2 marks questions)

8. Why does the conductivity of a solution decreases with dilution?
9. Give the importance of fuel cells over ordinary batteries.
10. Give the factors which affect corrosion.
11. Differentiate E.M.F. and potential difference.
12. Give the relation between conductivity and molar conductivity of a solution.
13. What are super-conductors? Give examples.
14. Explain the ohm's law.

(3 marks questions)

15. What is an electrochemical series? Give the applications of electrochemical series.
16. Give differences between electrochemical cell and Electrolytic cell.
17. Calculate the e.m.f. of the cell at 25°C



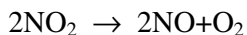
$$E^\circ (\text{Zn}^{2+} | \text{Zn}) = -0.763\text{V} \text{ and } E^\circ (\text{Fe}^{2+}/\text{Fe}) = -0.44\text{V}$$

Class - XII

Unit – 4 (Chemical Kinetics)

(1 mark questions)

1. What is the significance of negative sign in case of expressing rate of reaction in terms of reactants?
2. Why does the rate of reaction not remain constant throughout?
3. A first order reaction is found to have a rate constant, $k=5.5 \times 10^{-14} \text{ S}^{-1}$. Find the half life period of the reaction.
4. What is first order reaction?
5. What is collision frequency and what are effective collisions?
6. A large number of colliding molecules have energy more than threshold energy for a reaction, even then reaction is slow. Why?
7. Express the rate of the reaction :



in terms of the concentration of reactants and products.

Class - XII

Unit-4 (Chemical Kinetics)

(2 marks questions)

8. What is zero order reaction? Give example.
9. Calculate the overall order of a reaction, which has the rate expression :
$$\text{Rate} = k[\text{A}]^{\frac{3}{2}} [\text{B}]^{-1}$$
10. What is the difference between order and molecularity.
11. A first order decomposition reaction takes 40 minutes for 30% decomposition. Calculate its $t_{1/2}$ value.
12. Give differences between rate of a reaction and rate constant.
13. A reaction is of first order w.r.t. reactant A and of second order w.r.t. reactant B. How is the rate of this reaction affected when:
 - (i) the conc. of B alone is increased to three times.
 - (ii) the conc. of A as well as B are doubled.

14. What is half life period. Derive an expression for half life period of a first order reaction.

(3 marks questions)

15. What is rate determining step? Show that the slowest step in the mechanism of the reaction largely determines the rate of the reaction.
16. What are the factors, influencing the rate of chemical reaction? Explain.
17. Give the integrated rate expression for zero order reaction.

Class - XII

Unit – 5 (Surface Chemistry)

(1 mark questions)

1. How is positive adsorption differs from negative adsorption?
2. Why activated charcoal or a mixture of adsorbent is generally used in gas masks?
3. How critical temperature is related to adsorption of a gas?
4. Why a finely divided substance is more effective as an adsorbent?
5. What is Kraft temperature (T_k) and CMC.
6. What is principle of Dialysis?
7. What is the cause of Brownian movement?

(2 marks questions)

8. Define Gold number. How coagulation of gold sol is indicated by change in colour?
9. Differentiate oil-in-water (o/w type) and water-in-oil (w/o type) emulsions.
10. How oil-in-water or water-in-oil type emulsions can be identified. Give one test.
11. 40 ml of standard gold sol. needs 0.04mg of gelatin for its protection from coagulation. Calculate gold number of gelatin.
12. What are emulsions? Give their types.
13. What is Sorption? How it differs from adsorption?
14. Explain the saturation state in adsorption isotherms.

(3 marks questions)

15. (i) What is surface catalysis?
(ii) Explain the term "Activity of a catalyst" and "Selectivity of a catalyst". Give examples also.
16. What is electrophoresis? What is its significance?
17. Explain shape selective catalysis by Zeolites.

Unit – 6 (General Principles and processes of isolation of elements)

(1 mark questions)

1. What is the role of depressant in froth floatation process?
2. Differentiate mineral and ore.
3. What is smelting?
4. Define the terms 'gangue' and 'flux'.
5. What is the role of silica in the metallurgy of copper?
6. Why is pine oil used in froth floatation process?
7. How is cast iron different from pig iron?
8. Give the principle of zone refining method, in refining of metals.
9. Give percentage composition of Alnico alloy.
10. What is the role of cryolite in the metallurgy of aluminium?
11. What is the role of graphite rod in the electrometallurgy of aluminium?
12. Write the name of ores of aluminium and copper.

(2 marks questions)

13. Why is aluminium used for electric cables though it is relatively less conducting than copper?
14. Every ore is a mineral but every mineral is not an ore. Comment.
15. Give two uses of each of the following metals?
(i) Zinc (ii) Iron
16. Name three main varieties of iron. Which out of them is the purest?
17. Why do blisters generally appear when molten copper is allowed to cool in bessemer converter?
18. What is the significance of leaching in the extraction of aluminium?
19. Why can alumina not be reduced by carbon?
20. Give the principle of 'magnetic separation' method of refining of metals.
21. Explain the terms :
(i) Concentration or dressing of ore
(ii) Basic flux
(iii) Pyrometallurgy or thermal reduction
(iv) Calcination

Unit – 7 (P-block elements)

(1 mark questions)

1. What is inert pair effect?
2. Why NCl_5 does not exist?

3. As we go down the group the bond angle decreases as
 $\text{NH}_3 = 107.8^\circ$, $\text{PH}_3 = 93.6^\circ$ Explain it.
4. Ammonia has higher boiling point than phosphine. Why?
5. Which hydride of group 15 elements has lowest boiling point?
6. Give the names of three allotropes of phosphorus? Which out of these is most reactive?
7. Give one function (or use) of nitrolim ($\text{CaCN}_2 + \text{C}$)

(2 marks questions)

8. Give reactions for the manufacture of nitric acid, by Ostwald's process.
9. Why does ammonia act as a Lewis base?
10. Nitrous acid (HNO_2) acts both as an oxidising agent as well as reducing agent. How?
11. Why all the five bonds in PCl_5 are not equivalent? Explain.
12. Why conc. HNO_3 turns yellow on exposure to sunlight?
13. Why PCl_5 is known but PI_5 is not known?
14. Why pentahalides of Phosphorus are formed but penta-halides of nitrogen are not formed?

(3 marks questions)

15. (i) What are 3 isotopes of oxygen? Out of them which is radioactive?
(ii) What are 'amphoteric oxides' and 'neutral oxides'?
16. Like all other first elements of the groups, why oxygen shows anomalous behaviour?
17. Write the structural formula of :
 H_2SO_4 , $\text{H}_2\text{S}_2\text{O}_8$, H_2SO_3

(More questions)

1. SF_6 is known but SCl_6 is not known. Why?
2. Although fluorine is the most electronegative halogen, even then it is the weakest acid among hydrogen halides. Why?
3. F_2 is better oxidising agent than Cl_2 . Explain.
4. H_2S is a gas and H_2O is a liquid. Why?
5. Why chlorine shows bleaching action?
6. H_3PO_4 is triprotic acid Or H_3PO_3 is diprotic acid. Why?
7. Why does NO_2 dimerise?
8. Why does oxygen not show +4 and +6 oxidation states like sulphur?
9. Give 2 uses of He, Ne, Ar, Kr & Xe, Rn (noble gases)
10. Why noble gases have low boiling points?

Unit – 8 (d- and f-block elements)

(1 mark questions)

1. Chromium and copper have exceptionally high enthalpy values than those of their neighbours. Why?
2. Most of the transition elements show variable oxidation states. Explain the reason.
3. Compounds containing completely filled d-orbitals or completely empty d-orbitals are generally white. Why?
4. What is crystal field splitting?
5. What is d-d transition?
6. How number of unpaired electrons in a substance are related to magnetic moment of ions (B.M.)
7. What is lanthanoid contraction?

(2 marks questions)

8. Oxygen stabilizes the highest oxidation state of a metal even more than fluorine in case of 3d transition series metals. Explain.
9. Why a green layer is formed on the surface of copper metal, if, kept in moist air. Explain.
10. Why actinoids show large number of oxidation states?
11. Why silver is a transition metal but zinc is not? Explain.
12. Give two differences between lanthanoids and actinoids.
13. Why transition elements generally form coloured compounds?
14. Which out of $\text{Lu}(\text{OH})_3$ and $\text{La}(\text{OH})_3$ is more basic and why?

(3 marks questions)

15. Why KMnO_4 titrations are carried out only in the presence of dil H_2SO_4 .
16. Enthalpy of Zinc is the lowest (126 KJ/mol), in the series (Z=21) to (Z=30). Why?
17. (i) Calculate the spin only magnetic moment of M^{2+} (aq) (Z=27)
(ii) Which is a stronger reducing agent Cr^{2+} or Fe^{2+} and why?

(More questions)

1. Why Cu^+ ion is not stable in aqueous solution?
2. What happens when $\text{K}_2\text{Cr}_2\text{O}_7$ is heated with NaCl and H_2SO_4 ?
3. How the colour of $\text{K}_2\text{Cr}_2\text{O}_7$ solution depends on the P_H of solution. Explain.
4. Give the structure of CrO_4^{2-} and $\text{Cr}_2\text{O}_7^{2-}$ ions.
5. Of the ions Co^{2+} , Sc^{3+} and Zn^{2+} , which one will give coloured aqueous solutions and how will each of them respond to a magnetic field and why?

Unit – 9 (Co-ordination Compounds)

(1 mark questions)

1. What are co-ordination compounds? Give example.
2. What are double salts? Give example.
3. Give one difference between structural and stereo-isomerism.
4. Define the terms 'Co-ordination sphere' and 'co-ordination number'.
5. What are ambidentate ligands? Give example?
6. What are weak-field and strong-field ligands?
7. What are low spin complexes and high-spin complexes?
8. Give IUPAC names of the following co-ordinate compounds :-
 - (i) $K_2[HgI_4]$
 - (ii) $[Cr(NH_3)_3(H_2O)_3]Cl_3$
 - (iii) $Na_2[Fe(CN)_5NO]$
 - (iv) $[Cu(NH_3)_4]SO_4$
 - (v) $[Ni(CO)_4]$
 - (vi) $[Au(CN)_4]^-$
11. Calculate the oxidation no. of central metal atom in $[Fe(C_2O_4)_3]^{3-}$ and $[Ni(NH_3)_6]^{2+}$
12. Why geometrical isomerism is not shown by complexes with co-ordination number 4 having tetrahedral geometry?

(2 marks questions)

13. Predict the number of unpaired electrons in the square planar $[Ni(CN)_4]^{2-}$ ion
14. Why $[Ni(CN)_4]^{2-}$ sol. is colourless but $[Ni(H_2O)_6]^{2+}$ solution is green?
15. Explain with the help of valence bond theory, that $[Ni(CO)_4]$ is diamagnetic and tetrahedral.
16. $[Fe(CN_6)]^{3-}$ is weakly paramagnetic while $Fe(CN)_6^{4-}$ is diamagnetic. Explain.
17. Give biological importance of co-ordination compounds by giving 2 examples.
18. How crystal field theory explains the colours of transition metal complexes?
19. NH_3 readily form complexes but NH_4^+ does not. Why?
20. Draw the geometrical isomers of $[CoCl_2(NH_3)_4]^+$.
21. Explain linkage isomerism by giving one example.

Unit – 10 (Haloalkane and Haloarenes)**(1 mark questions)**

1. Why fluorination of hydrocarbons with F₂ gas occurs explosively?
2. Write the major product of the reaction :



3. Give 2 uses of Freon.
4. Give the name of the reaction, in which only haloarenes are treated with sodium, forming diaryls.
5. Why the boiling points of chlorides, bromides and iodides are considerably higher than those of the hydrocarbons of comparable molecular mass?
6. What is Kharasch effect or peroxide effect?
7. Give 1 test for detection of unsaturation (double or triple bond) in an organic molecule.

(2 marks questions)

8. Explain Finkelstein reaction.
9. Bromoalkanes can be easily prepared by refluxing the silver salts of a fatty acid. Name and explain the reaction.
10. Explain the stability of the haloalkanes having the same alkyl group.
11. In the formation of alkenes, dehydrohalogenation is classified as β-elimination reaction. Explain.
12. According to Saytzeff's rule, show saytzeff's elimination in case of haloalkanes.
13. (i) What is ambident nucleophile.
(ii) Give 'Williamson Synthesis' reaction.
14. Explain the reactivity of alkyl halides towards SN¹ reactions.

(3 marks questions)

15. How haloarenes are prepared from diazonium salts. Explain, by giving names of the reactions.
16. For isomeric alkyl halides, the boiling points decrease with branching. Explain.
17. Give the uses and environmental effects of Freon/DDT/Iodoform.

Unit – 11 (Alcohols, Phenols and Ethers)

(1 mark questions)

1. Solubility of alcohols in water decreases with increase in molecular mass of the alcohol. Why?
2. Why primary alcohols are the strongest acids and tertiary the weakest?
3. What is coupling reaction?
4. Give 2 uses of ethanol/methanol.
5. Why boiling points of ethers are much lower than those of the isomeric alcohols?
6. How will you distinguish between 1-phenylethanol and 2-phenylethanol. Give reaction for the test.
7. Write the chemical equation for the preparation of Ethoxybenzene.

(2 marks questions)

8. Why do phenols not give protonation reactions readily?
9. What is 'rectified spirit' and 'absolute alcohol'.
10. (i) Name one reagent which is used for the distinction of primary, secondary and tertiary alcohols.
(ii) How will you know whether a given OH group is alcoholic or phenolic in nature!
11. How will you synthesise salicylic acid from phenol?
12. Why are Grignard reagents soluble in ether but not in benzene?
13. Describe the 'Kolbe's reaction'.
14. Discuss the electrophilic substitution reactions in aromatic ethers.

(3 marks questions)

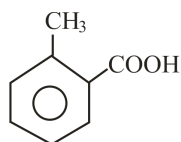
15. Why alcohols act both as nucleophiles as well as electrophiles while phenols usually act as nucleophiles only? Show the reaction for both.
16. Phenols are stronger acid than alcohols. Explain.
17. (i) Sodium metal can be used for drying diethyl ether, but not for an alcohol.
(ii) How will you convert chlorobenzene to picric acid.

Unit – 12 (Aldehydes, Ketones and Carboxylic acids)

(1 mark questions)

1. Carbonyl compounds mainly show nucleophilic addition reactions. Why?
2. Why it is necessary to control the pH during the reaction of aldehydes and ketones with ammonia derivatives?
3. Formic acid is stronger acid than acetic acid. Why?

4. The bond length of $>C=O$ in carboxylic acid is slightly larger than that in aldehydes and ketones. Why?
5. Why p-nitrobenzoic acid is stronger than benzoic acid?
6. How will you convert an acid into an ester without using an alcohol.
7. Out of p-chlorobenzoic acid and p-nitrobenzoic acid which is stronger and why?
8. Why are aldehydes more reactive than Ketones?
9. Give the IUPAC name of the following compound.



10. Give a suitable example of Hell-Volhard Zelinsky reaction.
 11. How can you distinguish an alcohol and a carboxylic acid.
 12. How would you obtain Acetone from acetic acid.
- (2 marks questions)**
13. Show reduction of aldehyde/ketone by 'clemmensen reduction'.
 14. How will you convert acetophenone to benzoic acid.
 15. Benzaldehyde is less reactive than acetaldehyde towards nucleophilic addition reactions. Explain.
 16. Formaldehyde gives cannizzaro reaction whereas acetaldehyde does not. Explain.
 17. Why acetaldehyde gives aldol condensation, while formaldehyde does not. Explain.
 18. Give a chemical test to distinguish between
 - (i) acetophenone and benzophenone
 - (ii) Ethanal and propanal
 19. Give one colour test to distinguish an aldehyde and a ketone.
 20. How is benzoic acid prepared from :-
 - (i) Toluene
 - (ii) Benzaldehyde
 21. Why aromatic acids are solids but acids of acetic acid group are mostly liquids?

Class - XII

Unit – 13 (Organic Compounds Containing Nitrogen)

(1 mark questions)

1. Why amines have lower boiling points than those of alcohols or carboxylic acids?
2. Why alkylamines are more basic than ammonia?
3. Which test can be used to distinguish between primary amines from secondary and tertiary amines? Name the reaction also.
4. What is 'diazotisation'?

5. Why tertiary amines do not undergo acylation?
6. Why do amines react as nucleophiles?
7. Give a chemical test to distinguish between aniline and N-methylaniline.
8. Aromatic primary amines cannot be prepared by Gabriel phthalimide synthesis. Why?
9. How will you convert Benzene into aniline?
10. Account for the following :
 - (i) pK_b of aniline is more than that of methylamine.
Or
 - (ii) Diazonium salts of aliphatic amines are less stable than those of aromatic amines.
Or
 - (iii) Aliphatic amines are more basic than arylamines.
11. Why tertiary amines are more basic than primary amines?
12. Lower aliphatic amines are soluble in water but higher amines are insoluble in water. Why?

(2 marks questions)

13. N-methylaniline is a stronger base than aniline and N, N- dimethyl aniline is even stronger than N-methylaniline. Explain.
14. Explain exhaustive alkylation.
15. Explain Hoffmann's elimination reaction.
16. Explain Schotten Baumann reaction.
17. Explain Libermann's nitroso reaction.
18. Give 1 test to distinguish ethylamine and aniline.
19. How will you convert Benzamine to benzoic acid.
20. How will you convert nitrobenzene into phenol.
21. Aniline does not undergo Friedel crafts alkylation. Explain.

(More questions)

1. Give one chemical test to distinguish between methylamine and dimethylamine.
2. In aromatic electrophilic substitution reactions, aniline on nitration gives a substantial amount of m-nitroaniline, although amino group is o- and p- directing.
3. Explain the Hoffmann mustard oil reaction.
4. Compare the basic strength of aniline and ethylamine.

Unit – 14 (Biomolecules)

(1 mark questions)

1. What is mutarotation?
2. Why sucrose is much useful for preserving foods such as Jams and Jellies, but glucose is not useful?
3. What are non-reducing sugars?
4. Why dentists caution you not to eat candy?
5. Explain the term 'Zwitter ion'.
6. What is isoelectric point?
7. What is Ninhydrin test?
8. Define the term ' α -helix'.
9. What is hypervitaminoses?
10. Give the chemical name of vitamin A/B₁/B₂/C
11. Explain the disease 'phenyl-ketone urea', which is a enzyme deficiency disease.
12. Name the vitamin, which helps in healing of cuts and wounds.

(2 marks questions)

13. What are the hydrolysis products of sucrose and lactose?
14. Give 4 structural differences between DNA and RNA.
15. Explain 'DNA fingerprinting'.
16. Give the relation of nucleosides, nucleotides and nucleic acids.
17. What are the deficiency diseases of vitamins :
A, B₁, C, D, E, K
18. Name the enzymes which convert :-
 - (i) Sucrose to Glucose and fructose
 - (ii) Maltose to Glucose
 - (iii) Starch to Glucose
 - (iv) Glucose to Alcohol
19. Why Vitamin C cannot be stored in our body?
20. The two strands in DNA are not identical but are complimentary. Explain.
21. Name the four bases present in DNA. Which one of these is not present in RNA?

Unit – 15 (Polymers)

(1 mark questions)

1. What is the difference between natural and synthetic polymers? Give 2 examples of each.
2. What are biopolymers?
3. Explain vulcanization.
4. What is the basic difference between thermosetting polymers and thermoplastic polymers?
5. What are cross linked polymers? Give one example.
6. What is the difference between nylon-6 and nylon-66.
7. How can you differentiate addition and condensation polymerisation?
8. All polymers are macromolecules but all macro-molecules are not polymers. Comment upon it.
9. How natural rubber is prepared from Isoprene?
10. Differentiate LDP and HDP
11. Give 2 uses of LDP and HDP each.

(2 marks questions)

12. How Buna-S is obtained.
13. What are biodegradable polymers?
14. Distinguish between homopolymer and copolymer.
15. Write chemical equation for the preparation of polyvinyl chloride.
16. What is the difference between copolymer and homopolymer?
17. How is bakelite made and what is its major use.
18. How polyacrylonitrile (PAN) is prepared?
19. How Buna-N is obtained?
20. What are the monomer units, for preparing PHBV.
21. How nylon-2-nylon-6 is obtained.

Unit – 16 (Chemistry in everyday life)

(1 mark questions)

1. What is chemotherapy?
2. Name a substance which can be used as an antiseptic as well as disinfectant.
3. What are food preservatives?
4. Name 2 sweetening agents used in the preparation of sweets for a diabetic patient.
5. How are synthetic detergents better than soaps.
6. Why do we require artificial sweetening agents?

7. What are the main constituents of dettol?
8. What is the role of Bithional in toilet soaps?
9. What are antipyretics? Give example.
10. What is the role of an antacid?
11. Define 'tranquillizer'.
12. What are 'antihistamines'?

(2 marks questions)

13. How Aspirin drug helps in prevention of heart attack.
14. Briefly discuss the cleansing action of detergents.
15. Without consulting the doctors, why medicines should not be taken?
16. Define 'analgesics'. Briefly discuss the 2 categories of analgesics.
17. What is tincture of iodine? What is its use?
18. How do antiseptics differ from disinfectants.
19. Define the following with one example in each case.
(i) Antimalarials (ii) Antimicrobials
20. Mention one use of following drugs :
(i) Ranitidine (ii) Aspirin (iii) Valium (iv) Chloramphenicol.
21. What are neutral detergents? Give example.

Class - XII

Solid State

Marks division	2 Marks	3 Marks	Total : 5 marks
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Two Marks Questions

1. What are Crystalline solids? Explain with suitable examples.
2. Why Crystalline solids are called long range order solids?
3. Give properties of Crystalline solids.
4. What are Amorphous solids? Explain with suitable examples.
5. Why amorphous solids are called short range order solids?
6. What are crystallites? Explain.
7. What are anisotropic and isotropic solids? Give examples.
8. What are molecular solids?
9. Give characteristics of solids.
10. Why are solids rigid and have specific shape?
11. Why do solids have a definite volume?
12. Why is glass considered as a super cooled liquid?
13. Refractive index of a solid is observed to have the same value along all directions. Comment on the nature of this solid.

14. Stability of a crystal is reflected in the magnitude of its melting point comment.
15. Distinguish between tetrahedral and octahedral void.
16. (i) Why Frenkel defect does not change the density of AgCl Crystal.
(ii) Differentiate substitutional and interstitial solids.
17. Distinguish between hexagonal close packing and cubic close packing.
18. Write the difference between amorphous and Crystalline solids.
19. Distinguish between crystal lattice and Unit cell.
20. Distinguish between hexagonal close packing and cubic close packing.
21. Will hcp and ccp for a given element have same density?
22. What is radius ratio and what is its significance?
23. According to band theory explain with diagram difference between a conductor and an insulator and a semi conductor.
24. Which have more entropy, real crystal or ideal crystal and why?
25. Why does zinc oxide exhibit enhanced electrical conductivity on heating?
26. Account for the following (i) Frenkel defects are not found in alkali metal halides (ii) Schottky defects lower the density of related Solids. (ii) Impurity doped Silicon is a semiconductor.
27. Difference between Frenkel and Schottky defects.
28. Define Ferromagnetism, paramagnetism, ferrimagnetism, antiferromagnetism, F-centres, diamagnetism.
29. How will you calculate the no. of atoms in a Unit cell. Discuss by taking different examples.
30. What do you know about Stoichiometric defects, non-stoichiometric defects and impurity defects?
31. Conductivity of NaCl is enhanced by the introduction of SrCl₂ as the impurity. Why?
32. Covalent bonding occur in both molecular and covalent network solids but these two types of solids differ greatly in their hardness and m.pt. Why.
33. Discuss the classification of Crystalline Solids with example and also discuss their properties.
34. Give properties of Crystalline solids and amorphous solids.
35. What is the effect of temp. on electrical conductivity of conductors and semi-conductors.
36. Define and explain *n*-type and *p*-type semiconductors.
37. What are 12-16 and 13-15 compds? Explain.

p-Block Elements**One mark questions.**

1. NH_3 acts as a lewis base how?
2. NH_3 is liquid where as PH_3 is a gas why?
3. Nitrogen exists as ' N_2 ' where as phosphorous exists as P_4 why?
4. How ammonia acts as a solvent?
5. Give structures of N_2O_5 and N_2O_3 .
6. Why white phosphorous is stored under water?
7. Why O_3 acts as a mild bleaching agent?

Two marks questions.

8. PCl_5 is known but NCl_5 is not known. Why.
9. NH_3 acts as a complexing agent how? Give suitable example.
10. Ionization enthalpy of nitrogen is more than oxygen. Why?
11. Give chemical reaction in support of the Statement that all the bonds in PCl_5 molecule are not equivalent.
12. Nitric oxide (NO) is paramagnetic in the gaseous state but diamagnetic in the liquid and solid states. Why?
13. Give structure of H_3PO_3 and H_3PO_4 and its basicity.
14. Bi^{+5} is a strong oxidising agent why?
15. Explain why 'N' and 'Bi' do not form pentahalides while phosphorous does?
16. The electron gain enthalpy with negative sign for oxygen (-141 KJ mol^{-1}) is less than that of Sulphur (-200 KJ mol^{-1}) Why?
17. (i) SF_6 is known but SH_6 is not known. Why?
(ii) OF_2 should be called oxygen difluoride and not fluoride oxide. Why?
18. (i) SF_4 undergoes hydrolysis but SF_6 does not. Why?
(ii) Among halogens ' F_2 ' is the strongest oxidising agent why?
19. Bond energy of ' F_2 ' is less than ' Cl_2 '. Why?
20. Interhalogen compounds are more reactive. Why?
21. Halogens show some specific colours. Why?
22. Bleaching action of chlorine is permanent but that of Sulphur trioxide is temporary. Why?
23. 'F' is more electronegative than 'I', even then HF has lower acidic strength as compare to HI. Why?
24. Which is more acidic and why?
 HClO , HIO , HBrO
25. HClO_4 is a stronger acid than H_2SO_4 . Why?
26. Xenon does not form fluorides such as XeF_3 and XeF_5 . Why?
27. Why do noble gases form compounds with fluorine and oxygen only?

28. What prompted Barlett to the discovery of noble gas compounds?
29. ClF_3 exist but FCl_3 does not. Why?
30. Why xenon forms maximum no. of compounds where as 'He' and 'Ne' not?
31. Noble gases are inert. Why?
32. Fluorine exhibits only - 1 oxidation state whereas other halogens exhibit +1, +3, +5 and +7 oxidation states. Explain.
33. Halogens have maximum negative electron gain enthalpy why?
34. Why are peptalialides more covalent than trihalides?
35. How O_3 reacts with I_2 , KI , ZnS , Sb , S_8 and P_4 ?
36. How does SO_2 reacts with Cl_2 , KMnO_4 , KIO_3 , SnCl_2 ?
37. How is Sulphuric acid manufactured.
38. How is HNO_3 manufactured.
39. How does H_2SO_4 reacts with 'C', $\text{C}_{12}\text{H}_{22}\text{O}_{11}$, $\text{CH}_3\text{CH}_2\text{OH}$.
40. How Cl_2 reacts with $\text{Ca}(\text{OH})_2$ and NaOH .

Class - XII

d- and F-block Elements

Total – 30 marks

One mark questions.

1. Why Zn^{2+} Salts are coloured where as Ni^{2+} Salts are colourless.
2. $\text{Mn}(\text{II})$ show maximum paramagnetic behaviour amongst the bivalent ions of the I transition series?
3. The melting and boiling points of Zn , Cd and Hg are low. Why?
4. Which out of $\text{La}(\text{OH})_3$ and $\text{Lu}(\text{OH})_3$ is more basic and why?
5. Chromium is a typical hard metal where as mercury is a liquid. Why?
6. Why Sm^{2+} , Eu^{2+} and Yb^{2+} ions in solutions are good reducing agents but an aqueous solution of Ce^{4+} is a good oxidising agent?
7. The +3 oxidation states of 'La', 'Gd', 'Lu' are especially stable. Why?

Two marks questions

8. (i) Give structure of Mn_2O_7
(ii) First ionization enthalpy of 'Zn', 'Cd' and 'Hg' is very high. Why?
9. (i) Atomic radii of the second and third transition series are almost the same why?
(ii) What are interstitial compounds? Give example.
10. Why transition metals and their compounds are used as catalysts?
11. (i) Why 'Zn', 'Cd', and 'Hg' are not considered as transition elements?
(ii) Give structure of $\text{Cr}_2\text{O}_7^{2-}$ and CrO_4^{2-} ions.

12. How is potassium dichromate prepared?
13. How does $K_2Cr_2O_7$ reacts with KI, $FeSO_4$, SO_2 , $NaNO_2$?
14. How is $KMnO_4$ manufactured?

Three mark questions

15. How does $KMnO_4$ reacts with $CH_2=CH_2$, H_2S , KNO_2 , H_2O_2 , CH_3CH_2OH ?
16. What is lanthanoid contraction? What is its reason and what are its consequences?
17. Differentiate Lanthanoids and Actinoids.
18. Why is the separation of Lanthanoids more difficult?
19. Chemistry of all the Lanthanoids are quite similar. Why?
20. Write the chemistry of chromyl chloride test.
21. Why is Eu^{2+} more stable than Ce^{2+} ?
22. Why Lanthanoids are uniformly trivalent?
23. Explain that transition elements form alloys.
24. Why do transition elements form a number of complexes?
25. Why do transition elements form, coloured compounds?
26. Which is a stronger reducing agent Cr^{2+} and Fe^{2+} and Why?
27. Why are transition metals weaker reducing agents as compared to S-block elements?
28. Why do Zr and Hf exhibit similar properties?
29. What is the action of heat on $KMnO_4$?

Co-ordination Compounds

Total – 30 marks

- Write IUPAC names of the following compounds.

(i) $K_3[CO(NO_3)_6]$	(ii) $[CoCl(NO_2)(NH_3)_4]Cl$	
(iii) $[Pt(NH_3)_2Cl_2]$	(iv) $K_2[Cu(CN)_4]$	2 marks
- Write down the formulae of the following co-ordination compounds.

(i) hexaaqua iron (II) sulphate	
(ii) potassium hexacyano ferrate (III)	2 marks
- How will you distinguish between the following isomer pairs?

(i) $[Co(NH_3)_5Br]SO_4$	(ii) $[Co(NH_3)_5SO_4]Br$
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- $[Ti(H_2O)]^{3+}$ is coloured while $[Fe(H_2O)_6]^{3+}$ is colourless why?
- $[Fe(CN)_6]^{4-}$ is diamagnetic where as $[Fe(CN)_6]^{3-}$ is weakly paramagnetic. Why.

Two Marks questions

- $[Ni(CO)_4]$ has tetrahedral geometry where as $[Ni(CN)_4]^{2-}$ has square planer. Why?
- $[FeF_6]^{3-}$ and $[Fe(CN)_6]^{3-}$ have different magnetic properties. Explain why?
- $K_4[Fe(CN)_6]$ and $K_3[Fe(CN)_6]$, which out of these two is more stable and why?
- Illustrate linkage and ionisation isomerism with example.
- What is co-ordination isomerism? Explain with example.
- Explain the differences between weak field and strong field ligand?
- What are inner and outer orbital complexes?
- What are 't_{2g}' and 'e_g' orbitals explain?
- Discuss hydrate isomerism with example.

Three Marks questions

- How are ligands classified as unidentate, tridentate and polydentate ligands? Give proper examples.
- How is $[Cu(CN)_4]^{2-}$ formed? Discuss its structure, hybridisation and magnetic behaviour.
- Write a short note on optical isomerism in co-ordination compounds.

Halo alkanes and Haloarenes

Q.No. 1-7 = 1 Mark; 8-14 = 2 Marks; 15-17=3 Marks Total – 30 marks

- Why the boiling point of an alkyl halide is higher than that of corresponding alkane?

2. Explain why thionyl chloride is preferred for preparing alkyl chlorides from alcohols.
3. Ethyl chloride is a gas, whereas ethyl iodide is a liquid at room temp. Explain.
4. Why is chloroform stored in dark brown bottles?
5. Which compound gives iodoform test.
6. Give example of Wurtz-fitting reaction.
7. Write the structural formula and IUPAC name of BHC.
8. How will you obtain haloalkanes from hydrocarbons by free radical halogenation?
9. How will you prepare haloalkanes from alcohols? Give mechanism.
10. Give Hunsdiecker reaction and Swarts reaction.
11. How will you explain the relative reactivity of haloalkanes?
12. Explain why alkylhalides show nucleophilic substitution reactions?
13. How will you prepare haloarenes from aromatic hydrocarbons? Give two examples.
14. The boiling points of isomeric dihalobenzene are nearly the same but their melting points are quite different. Why?
15. How will you explain the low reactivity of haloarenes as compared to halo alkanes?
16. Account for the following.
 - (i) Vinyl chloride is less reactive than ethyl chloride.
 - (ii) Benzyl chloride is more reactive than chlorobenzene towards nucleophilic substitution reaction.
17.
 - (i) Discuss the stereo chemistry of SN^2 reaction.
 - (ii) Discuss the stereo chemistry of SN^1 reaction.

Class - XII

Halo alkanes and Haloarenes

More questions :

1. Treatment of alkyl halides with alc. $AgNO_2$ give mainly nitroalkanes while that with aq. $NaNO_2$ give mainly alkyl nitrites explain. Why?
2. Alkyl halides with aq. KOH give alcohols but with alc. KOH give alkenes why?
3. Why alkyl halides are immiscible in water although they are polar.
4. Why the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride?
5. Why aryl halides are less reactive than alkyl halides?
6. Acidic strength of phenols is more than alcohols why?
7. What are ambident nucleophiles? Explain with example.
8. Out of HCl and $SOCl_2$ which is preferred for converting ethanol into chloroethane and why?
9. Why is dehydrohalogenation reaction in haloalkanes termed as β -elimination?
10. How do products differ when ethyl bromide reacts separately with KCN and AgCN?
11. Why does electrophilic substitution take place at Ortho and Para position in haloarenes?

Alcohols, Phenols and Ethers

Q.No. 1-7=1 Mark; 8-14= 2 Marks; 15-17=3 Marks Total = 30 Marks

1. Why can't rectified spirit be converted into absolute alcohol by simple distillation?
2. Give two important uses of methanol.
3. Why are ethers insoluble in water?
4. How will you obtain alcohols from haloalkanes?
5. C_2H_5OH has higher boiling point than C_2H_5Br . Why?
6. How will you distinguish between ethanol and methanol?
7. How is methanol manufactured?
8. How will you distinguish between 1° , 2° & 3° alcohols by time test?
9. What is meant by hydroboration – oxidation reaction? Give example.
10. What is Fries rearrangement reaction?
11. Boiling point of O-nitrophenol is less than that of p-nitrophenol. Explain.
12. Phenols are more acidic than alcohols. Explain.
13. Give two reactions showing acidic nature of phenol.
14. Alcohols are easily protonated as compare to phenols. How?
15. (i) Dipole moment of methanol is higher than that of phenol. Why?
(ii) O-nitrophenol is more acidic than m-nitrophenol. Why?
16. (i) Diethyl ether is less soluble in water. Why?
(ii) Ethers are used as solvent in industry. Why?
17. Preparation of ethers by acid-catalysed dehydration of secondary and tertiary alcohols is not suitable method. Give reason.

More questions :

1. How will you distinguish between 1° , 2° and 3° alcohol by time test and victor Meyers method?
2. Why alcohols are weaker acids than water?
3. Out of halogen acids HI is more reactive with alcohols than HBr and HCl justify.
4. Out of phenol and benzene, which is more easily nitrated and why.
5. Arrange following compd. in increasing order of their acid strength and explain. Why it is so.
Propan-1-ol, 2,4,6- trinitrophenol, nitrophenol, 3,5- dinitro phenol, phenol, 4-methyl phenol.
6. Explain why dehydration of alcohols to form alkenes is always carried out with conc. H_2SO_4 and not with conc. HCl.
7. Account for the fact that unlike phenol, 2,4- dinitrophenol and 2,4,6- tri-nitrophenol are soluble in aq. sodium carbonate Sol.?
8. Why di-tert. butyl ether cannot be prepared by Williamson's Synthesis.

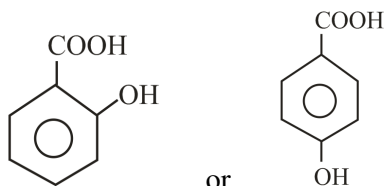
9. HI is a better reagent than HBr for cleavage of ethers.
10. Ethers possess a dipole moment even if the alkyl groups in the molecule are identical. Why?
11. Why a non symmetrical ether is not prepared by heating mixture of R-OH and R¹-OH in acid?
12. While separating mixture of Ortho and para nitrophenols by steam distillation, name the isomer which is more volatile.
13. Why Ortho nitrophenol is more acidic than ortho-methyl phenol?
14. Why phenol has smaller dipole moment than methanol?
15. Why alcohols are easily protonated as compare to Phenols?
16. Why is that tert. alcohol show greater reactivity towards hydrogen halide than Sec. and prim. alcohol.
17. Explain how -OH gr. in benzene ring activates it towards electrophilic substitution reaction.
18. Compare the acidic strength of Prim., Sec. and tert alcohols.
19. How does the nitration of Phenol with dil HNO₃ differ from nitration of Phenol with conc. HNO₃ in the presence of H₂SO₄.
20. Explain why Ethyl alcohol and dimethyl ether are isomeric but the b. pt. of ethyl alcohol is higher?
21. C-O-C bond angle in ethers is higher than H-O-H in H₂O though 'O' is sp³ hybridised in both the case.
22. Phenyl methyl ethers react with HI to give phenol and methyl Iodide and not Iodobenzene and methyl alcohol. Why?

Class - XII

Aldehydes and Ketones

1. Carbonyl compds mainly show nucleophilic addition reactions. Why?
2. Draw structure of Carbonyl group and indicate the 'σ' and π bond and the electrophilic and nucleophilic centres.
3. Sodium bi sulphite is used for the purification of aldehydes and ketones. Explain.
4. Why do aldehydes and ketones undergo nucleophilic addition reaction?
5. Why is it necessary to control pH during the reactions of aldehydes and ketones with ammonia derivatives?
6. Why do aldehydes and ketones have high dipole moments?
7. Why benzaldehyde is less reactive than aliphatic aldehyde ?
8. Why pK_a of ethanoic acid is higher than pK_a of methanoic acid?
9. Why Carboxylic acids do not give tests of carbonyl or hydroxyl group?
10. Why does HCOOH does not give HVZ reaction, but CH₃COOH gives.
11. Chloroacetic acid is Stronger than acetic acid and why?
12. Formic acid is stronger acid than acetic acid why?

13. In the preparation of an ester by the reaction of carboxylic acid and alcohol, ester is distilled as fast as it is formed. Why?
14. Which one is stronger acid and why?



15. Fluoroacetic acid is stronger acid than chloroacetic acid why?
16. Trichloro acetic acid is stronger acid than dichloro acetic acid than acetic acid why?
17. The bond length of $>C=O$ in carboxylic acid is slightly larger than that in aldehydes and ketones why?
18. Why p-nitrobenzoic acid is stronger acid than benzoic acid?
19. The b.pts of acid anhydrides are higher than that of corresponding carboxylic acids from which they are formed & why?
20. Why p-Nitrobenzoic acid is stronger than benzoic acid?
21. Benzoic acid is stronger acid than acid and why?
22. How will you convert an acid into an ester without using an alcohol?
23. Out of methanoic acid and ethanoic acid, which has higher pK_a value and why?
24. Acid hydrolysis of esters is of reversible nature, while alkaline hydrolysis is irreversible? Why.
25. Fluorine is more electro negative than chlorine, but p-fluoro benzoic acid is a weaker acid than p-chlorobenzoic acid.
26. Although phenoxide ion has more no. of resonating structures than carboxylate ion, carboxylic acid is stronger acid than phenol. Why?
27. Acetic acid can be halogenated in the presence of red P and Cl_2 but formic acid cannot be halogenated in the same way. Explain?
28. Out of p-chloro benzoic acid and p-nitrobenzoic acid which is stronger and why?
29. Most aromatic acids are solids while acetic acid and other acids of this series are liquids why?
30. Discuss structure of Carboxylic acids. How do you account for acidic character of Carboxylic acids?
31. Formaldehyde gives cannizzaro's reaction whereas acetaldehyde does not. Why.
32. p-hydroxy benzoic acid is less acidic than benzoic acid where as ortho hydroxy benzoic acid is about 15 times more acidic than benzoic acid. Why?
33. Hydrazones of acetaldehyde are not prepared in highly acidic medium. Why?
34. Why aldehydes are more reactive than ketones?

Nitrogenous Comps

1. Electrophilic substitution in case of aromatic amines takes place more readily than benzene. Why?
2. Why is aryl diazonium ion is more stable than alkyl diazonium ion?
3. It is difficult to prepare pure amine by ammonolysis of alkyl halides.
4. Why is aniline less basic than ethylamine?
5. Although amino group is O- and p-directing in aromatic electrophilic substitution reactions, aniline on nitration gives a substantial amount of m-nitroaniline.
6. How is indicator methyl orange obtained?
7. Sulphanilic acid is soluble in dil. NaOH but not in dil HCl. Explain.
8. p-methoxy aniline is a Stronger base than aniline but p-nitroaniline is a weaker base than aniline. Explain.
9. CH_3CONH_2 is a weaker base than $\text{CH}_3\text{CH}_2\text{NH}_2$ why.
10. Aniline does not undergo Friedel - Crafts reaction why?
11. Arrange the following in increasing order of their basic strength and give reason.

CH_3NH_2 ,	$(\text{CH}_3)_2\text{NH}$	and	$(\text{CH}_3)_3\text{N}$
$\text{C}_2\text{H}_5\text{NH}_2$,	$(\text{C}_2\text{H}_5)_2\text{NH}$	and	$(\text{C}_2\text{H}_5)_3\text{N}$
12. Why aromatic primary amines cannot be prepared by Gabriel phthalamide Synthesis?
13. Why does CuSO_4 solution gives deep blue colour with MeNH_2 ?
14. Why are amides partially neutral in nature?
15. Explain the observed pK_b order of Me_2NH , Me NH_2 and Me_3N .
16. How do cyanides and isocyanides differ in their structure?
17. Which is more basic aliphatic amines or ammonia and why?
18. Amides are weaker bases than amines why.
19. Why primary amines have higher boiling point than tertiary amines?
20. Why are aromatic amines weaker bases than aliphatic amines?
21. Differentiate between alkyl cyanides and isocyanides.
22. Why is nucleophilic substitution of p-nitrochloro benzene easier than that of chlorobenzene?
23. Why aniline is a weaker base than cyclohexyl amine. Explain.
24. Aniline has a higher b. pt. than chlorobenzene. Why?
25. Why is aniline soluble in dil. HCl while nitrobenzene is insoluble in dil. HCl?
26. Is it possible to prepare aniline by Gabriel Phthalamide Syn?
27. Ethylamine is soluble in water where as aniline is insoluble. Why?
28. In trimethyl amine, the bond angle is 108° . Explain.

Bio molecules

Q.No. 1-7=1 Mark; 8-14= 2 Marks; 15-17=3 Marks Total = 30 Marks

1. What is biochemistry?
2. What are biochemicals?
3. What are disaccharides? Give one example.
4. What is meant by inversion of Sugar?
5. What is invert sugar?
6. What products are obtained when lactose is hydrolysed?
7. What is muta-rotation?
8. Draw the structure of cellulose.
9. Glucose is soluble in water but cyclohexane or benzene is not soluble in water. Why?
10. How is glucose prepared?
11. How does glucose react with tollen's reagent?
12. Discuss the evidence leading to cyclic structure of D(+) glucose.
13. Explain the main differences between α -glucose and β -glucose.
14. Discuss structure of fructose.
15. (i) What are amino acids? Describe Zwitter ion structure.
(ii) Explain isoelectric point of amino acids.
16. What is peptide linkage? Give differences between polypeptide and protein.
17. Explain the tertiary structure of proteins. What type of bonding is responsible for their structures?

More questions.

18. What is the effect of denaturation on the Structure of proteins?
19. What do you mean by denaturation of proteins?
20. What are enzymes and co-enzymes? Mention various steps involved in an enzyme catalysed reaction.
21. Differentiate between primary and secondary structure of proteins.
22. Differentiate between nucleoside and nucleotide.
23. What are nucleic acids? Name the types of bases present in these nucleic acids.
24. Differentiate between ribose and de-oxyribose.
25. Two strands of DNA are not identical but are complementary comment.
26. Explain the term mutation in DNA.
27. Give differences between RNA and DNA.
28. Describe briefly transcription and translation.
29. What is genetic engineering? What are its aims?
30. What is meant by mutation? What are the consequences of mutation?

Bio molecules**More questions.**

1. Write the structure of adenosine triphosphate indicating clearly the energy rich bonds. How does this molecule form the source of energy?
2. What is a peptide bond? Give an example.
3. Give differences between polypeptide and proteins; fibrous and globular proteins.
4. Give difference between nucleotide and nucleoside.
5. State importance of biotechnology in daily life.
6. Give difference between enzymes and chemical catalysts.
7. What are reducing and non-reducing sugars?
8. What changes occur during digestion of a protein in humans?
9. Give functions of various types of RNA found in the cell.
10. Give difference between enzyme and co-enzyme; α -helix and β -pleated structure.
11. Give difference between primary and secondary St. of Protein.
12. Enumerate structural difference between DNA and RNA.
13. Explain muta rotation with the help of D-glucose.
14. How does DNA replicate? Describe the mechanism of replication. How is the replication responsible for preservation of heredity?
15. Comment on specificity of enzyme action. Give reason for specificity.
16. Amino acids are amphoteric in nature. Why?
17. On electrolysis in acidic sol. amino acids migrate towards cathode while in alkaline sol. these migrate towards anode. Why?
18. Write down the structures and names of the products when D-glucose is treated with acetic anhydride, hydrocyanic acid, bromine, conc. HNO_3 and HI.
19. Enumerate the rxns of glucose which cannot be explained by open chain st.
20. Amylose and cellulose are both straight chain Polysaccharides containing only D-glucose units. What is structural difference between two?
21. Which forces are responsible for the stability of α -helix? Why is it named as 3.6₁₃ helix?
22. What are complementary bases? Show H-bonding between adenine, thymine, guanine and cytosine.

Polymers

Q.No. 1-7=1 Mark; 8-14= 2 Marks; 15-17=3 Marks Total = 30 Marks

1. What are homopolymers? Give one example.
2. What are copolymers? Give example.
3. Write the preparation of polypropylene.
4. Write two uses of teflon.
5. Explain the differences between Buna-N and Buna-S rubber.
6. What are the monomer units of bakelite?
7. What is vulcanisation? Why is rubber vulcanised?
8. Explain addition and condensation polymers giving one example in each case.
9. Explain the linear and cross linked polymers with example.
10. How are low density polythylene and high density polythylene manufactured?
11. Explain how do 1,3-butadiene polymerise?
12. How is teflon Synthesized?
13. Write equation for the Synthesis of polymethyl methacrylate.
14. What is the difference between nylon-6 and nylon 66?
15. How nylon 66 is synthesized? Why is it called nylon 66?
16. What is natural rubber? How is it synthesized?
17. (i) How acetylene is converted into neoprene?
(iii) How are terylene and glyptal prepared?

Chemistry in Everyday life

Q.No. 1-7=1 Mark; 8-14= 2 Marks; 15-17=3 Marks Total = 30 Marks

1. What is meant by chemo therapy?
2. Which forces are involved in holding the drugs to the active site of enzymes?
3. What is meant by active site and allosteric site?
4. What are antagonists and agonists?
5. What are tranquillizers? Give example.
6. Why the medicines should not be taken without consulting the doctors?
7. Why paracetamol is preferred to aspirin?
8. What is heroin? What is its chemical name?
9. What are artificial sweetening agents? Give examples.
10. What are food preservatives?

11. (i) Why is bithionol added to soap?
(ii) Why detergents are called Soapless soaps?
12. (i) Why is the use of aspartame limited to cold foods and drinks only?
(ii) What is BHA and BHT?
13. What do you understand by Antacids?
14. Why are cimetidine and ranitidine better antacids than Sodium bicarbonate or magnesium hydroxide?
15. How do antiseptics and disinfectants differ?
16. What are antibiotics? Explain.
17. Discuss the varieties of Soaps.