

Question
Bank

CBSE XII



P I C S

PRADEEP SHARMA'S CHEMISTRY

I N S T I T U T E

Engineering (JEE) | Medical (NEET) | NDA | CBSE – 11th & 12th

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happens when
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opportunity.*
- Seneca

CBSE XII

PICS - IMPORTANT QUESTION BANK CHEMISTRY PHYSICAL CHEMISTRY-XII

THE SOLID STATE

1. Name an element with which silicon can be doped to give a p-type semiconductor.
2. Why is common salt sometimes yellow instead of being pure white?
3. What makes alkali metal halides sometimes colored which are otherwise colorless?
4. What is the effect of Schottky and Frenkel defects on the density of crystalline solids?
5. What is Curie temperature?
6. Which stoichiometric defect result in increase in density ??
7. Name the non stoichiometric point defect responsible for colour in alkali halides.
8. Why is glass considered a super cooled liquid ?
9. What is a semiconductor? Describe two main types of semiconductors, giving examples.
10. Explain how vacancies are introduced in an ionic solid when a cation of higher valency is added as an impurity in it
11. What type of substances would make better permanent magnets, ferromagnetic or ferrimagnetic? Justify your answer.
12. Assign reason why some of the very old glass objects appear slightly milky instead of being transparent.
13. An element crystallizes in a structure having fcc unit cell with edge length of 200 pm. Calculate its density, if 200 g of this element contains 24×10^{23} atoms.
14. The length of the unit cell edge of a body centered metal crystal is 352 pm. Calculate the radius of an atom of a metal.
15. An element ($z=60$) having face centered cubic unit cell has a density of 6.23 g/cm^3 . What is edge length of unit cell.
16. State the difference between schottky and frenkel defects. Which of the two changes the density of the solids.
17. An element crystallizes in the simple cubic structure .Its density is 8 g/cm^3 and its 200 g contains 24×10^{23} atoms .Calculate the edge length.
18. What is the coordination number of an octahedral void? Which of the following lattices has the highest packing efficiency - (i) FCC (ii) BCC (iii) simple cubic
19. Atoms of element B form hcp lattice and those of the element A occupy $2/3$ rd of tetrahedral voids .What is the formula of the compound formed by these elements A and B?
20. What makes a glass different from a solid such as quartz/Under what conditions could quartz be converted into glass?
21. What is a semiconductors ?Describe n-type & p-type of semiconductors , giving examples .
22. Conductivity of NaCl is enhanced by the introduction of SrCl_2 as the impurity. Why?
23. What is the effect of temp. on electrical conductivity of conductors and semiconductors.
24. What are 12-16 and 13-15 compds? Explain.
25. What are anisotropic and isotropic solids? Give examples.
26. Why is glass considered as a super cooled liquid?
27. Why does zinc oxide exhibit enhanced electrical conductivity on heating?
28. Define Ferromagnetism, paramagnetism, ferrimagnetism, antiferromagnetism, Fcentres,diamagnetism.
29. What do you know about Stoichiometric defects, non-stoichiometric defects and impurity defects?
30. Analysis shows that Nickel oxide has $\text{Ni}_{0.98} \text{O}_{1.00}$ what fractions of nickel exist as Ni^{2+} ions and Ni^{3+} ions?



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SOLUTIONS

1. What do you mean by Democreative Properties?
2. Define isomatic solution or isotonic solution ?
3. State Raoult's law for a binary solution containing non-volatile components.
4. Out of 1M solution of sugar and 1M solution of NaCl which will have greater boiling point ?
5. Why do doctors advise gargles by saline water in case of sore throat?
6. What are azeotropes? Explain with its types.
7. What type of non idealities are exhibited by cyclohexane -ethanol and acetone chloroform mixture?
Give reasons for your answer.
8. Which colligative property is best for the determination of molecular mass of polymers?
9. 0.6ml of acetic acid (CH_3COOH), having density 1.06 g ml^{-1} , is dissolved in 1 litre of water. The depression in freezing point observed for this strength of acid was 0.02050°C . Calculate the van't Hoff factor and the dissociation constants of acid.
10. Determine the osmotic pressure of a solution prepared by dissolving 25 mg of K_2SO_4 in 2 litres of water at 25°C , assuming that it is completely dissociated.
11. What is meant by reverse osmosis, give its condition and its application?
12. What is antifreezing agent & coolant and also give an example?
13. What is the cause of abnormal molecular masses ?
14. Phenol associates in benzene to certain extent to form dimer. A solution contains $20 \times 10^{-3} \text{ kg}$ of phenol in 1kg of benzene has its freezing point decreased by 0.61 K . Calculate the fraction of phenol that has dimerised. (K_f for benzene = 5.512)
15. The osmotic pressure of blood is 8.21 atm at 37°C . How much glucose should be added per litre for an intravenous injection that is at same osmotic pressure as blood?
16. Find out van't Hoff's factor for - (a) NaCl (b) $\text{C}_6\text{H}_{12}\text{O}_6$ (c) $\text{K}_4[\text{Fe}(\text{CN})_6]$
17. In deep sea diving, why the condition "the bends" occur? Why He is added for deep sea diving ?
18. Which is better m or M & Which is more concentrated 1m or 1M?
19. Why common salt is used to clear the snow on the roads?
20. How plasmolysis is different from hemolysis?
21. What happened to peeled egg when dipped in water? Explain.
22. Non-ideal solutions show positive and negative deviations from Raoult's law. What are these deviations and why they are caused?
23. How many mL of 0.1 M HCl are required to react completely with 1 g mixture of Na_2CO_3 and NaHCO_3 containing equimolar amounts of both?
24. A solution is obtained by mixing 300 g of 25% solution and 400 g of 40% solution by mass. Calculate the mass percentage of the resulting solution?
25. Determine the amount of CaCl_2 ($i = 2.47$) dissolved in 2.5 litre of water such that its osmotic pressure is 0.75 atm at 27°C .
26. A sample of drinking water was found to be severely contaminated with chloroform (CHCl_3) supposed to be a carcinogen. The level of contamination was 15 ppm (by mass): (i) express this in percent by mass (ii) determine the molality of chloroform in the water sample.
27. Two elements A and B form compounds having formula AB_2 and AB_4 . When dissolved in 20 g of benzene (C_6H_6), 1 g of AB_2 lowers the freezing point by 2.3 K whereas 1.0 g of AB_4 lowers it by 1.3 K . The K_f is $5.1 \text{ K kg mol}^{-1}$. Calculate atomic masses of A and B.
28. What care should be taken during Intravenous injection ? 24. A 5% solution of cane sugar (M.wt. 342) is isotonic with 0.877% solution of urea at same Temperature. Find the molecular wt. of urea.

ELECTROCHEMISTRY

FOCUS POINTS

Representation of Cell; Finding EMF of the cell; Nernst equation; Calculation of Conductivity, Molar conductivity, Cell constant & Standard cell potential; Lead storage Battery & Fuel cells.

1. Can you store copper sulphate solutions in a zinc pot ?
2. Why does the conductivity of a solution decrease with dilution?
3. HCl does not give an acidic solution in benzene. Why?
4. How does cathodic protection of iron operate?
5. What is meant by fuel cell & give its reactions?
6. Rusting of iron is quicker in saline water than in ordinary water. Why is it so?
7. How much copper is deposited on the cathode of an electrolytic cell if a current of 5 ampere is passed through a solution of copper sulphate for 45 minutes?
8. What is meant by specific conductivity of a solution / The specific conductance of a 0.12 N solution of an electrolyte is $2.4 \times 10^{-2} \text{ S/cm}$. Calculate its equivalent conductance.
9. Calculate the potential of hydrogen electrode in contact with a solution whose pH is 10.
10. A solution of CuSO_4 is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode?
11. Write the chemistry of recharging the lead storage battery, highlighting all the materials that are involved during recharging.
12. Define conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration.
13. What is meant by molar conductivity of a solution? The specific conductivity of 0.4M solution at 298 K is 4.96 S/cm calculate its molar conductivity
14. Predict if the following reaction is feasible or not - $E_{\text{Ag}^+/\text{Ag}} = +0.80 \text{ V}$ $E_{\text{Cu}^{2+}/\text{Cu}} = 0.34 \text{ V}$
 $\text{Cu}^{2+}(\text{aq}) + 2 \text{Ag}(\text{s}) \rightarrow \text{Cu}(\text{s}) + 2 \text{Ag}^+(\text{aq})$
15. The resistance of a conductivity cell containing 0.001 M KCl at 298 K is 1500Ω . What is the cell constant if conductivity of 0.001 M KCl solution at 298 K is $0.146 \times 10^{-3} \text{ S cm}^{-1}$.
16. Resistance of a conductivity cell filled with 0.1 mol L^{-1} KCl solution is 100Ω . If the resistance of the same cell when filled with 0.02 mol L^{-1} KCl solution is 520Ω , calculate Conductivity and Molar conductivity of 0.02 mol L^{-1} KCl solution. The conductivity of 0.1 mol L^{-1} KCl solution is 1.29 S/m .
17. Three electrolytic cells A, B and C containing solutions of zinc sulphate, silver nitrate and CuSO_4 resp. are connected in series. A steady current of 1.5 ampere was passed through them until 1.45g of silver were deposited at the cathode of cell B. How long did the current flow? What mass of Cu and what mass of Zn were deposited in the concerned cells? (Atomic masses of Ag = 108, Zn = 65.4, Cu = 63.5)
18. For what concentration of $\text{Ag}^+(\text{aq.})$, will the emf of given cell be zero at 25°C , if the concentration of $\text{Cu}(\text{s}) \mid \text{Cu}^{2+}(0.1\text{M}) \parallel \text{Ag}^+(\text{aq.}) \mid \text{Ag}(\text{s})$? Given, $E^\circ_{\text{Ag}^+/\text{Ag}} = 0.80\text{V}$; $E^\circ_{\text{Cu}^{2+}/\text{Cu}} = 0.34\text{V}$
19. Ques - Predict the product during following electrolysis -
(a) Aqueous Solⁿ of AgNO_3 with Ag electrode. (b) Aq. Solⁿ of AgNO_3 with Pt electrode.
(c) Dil. Aq. Solⁿ of H_2SO_4 Pt electrode. (d) Aq. Solⁿ CuCl_2 with Pt electrode.
20. Numericals based upon NERNST equation



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CHEMICAL KINETICS

FOCUS POINTS

Order of a reaction & Molecularity ; Expression and Derivation of

Zero and First order reactions; Numericals on half life of a reaction , Numericals on Activation energy

1. What is difference between average rate and instantaneous rate of a chemical reaction?
2. Give the units for specific reaction rate constant for (a) zero order (b) 2nd order reaction.
3. What is known as activation energy ? How is the activation energy affected by :-
(i) The use of a catalyst and (ii) rise in temperature?
4. The rate constant for a first order reaction becomes six times when the temperature is raised from 350K to 400K. Calculate the activation energy for the reaction.
5. The conversion of molecules X to Y follows second order kinetics. If concentration of X is increased to three times how will it affect the rate of formation of Y.
6. What will be the effect of temperature on rate constant? Derive the relation?
7. Show that in a first order reaction ,time required for completion of 99.9% is 10 times of half life of the reaction.
8. The rate of the chemical reaction doubles for an increase of 10K in absolute temperature from 298 K. Calculate activation energy?
9. Derive equation for the first order reaction?
10. The rate of reaction X gives Y becomes 8 times when the concentration of the reactant X is doubled. Write the rate law for the reaction?
11. Give differences between-
(a) Order & molecularity (b) Rate of reaction & Specific reaction rate ?
12. What is known as activation energy and Threshold energy ?
13. Time required to decomposed SO_2Cl_2 to half of its initial amount is 60 minutes . If the decomposition is a first order reaction, calculate the rate constant of the reaction.
14. The rate constants of a reaction at 500K and 700 K are 0.02 per second and 0.07 per second respectively .Calculate the values of activation energy and arhenius factor.
15. What is meant by Average rate and Instantaneous rate. Determine the Rate law and order of reaction for A and B from the given data:
Also determine value of rate constant.
And find the rate if the conc. Of
[A] = 0.7 mol and [B] = 0.3 mol.

EXPERIMENT	Conc. [A] mol/litre	Conc. [B] mol/litre	Rate of reaction mol/litre/sec
I	0.1	0.2	2×10^3
II	0.2	0.2	4×10^3
III	0.1	0.4	8×10^3

16. The E_a of first order reaction at 300K is 60 KJ/mol . In presence of a catalyst E_a is lowered to 50 KJ/mole at same temperature. How many times the rate change.
17. The activation energy for the reaction $2HI_{(g)} \rightarrow H_2 + I_{2(g)}$ is 209.5 kJ mol⁻¹ at 581K. Calculate the fraction of molecules of reactants having energy equal to or greater than activation energy?
18. The experimental activation energy for the reaction of iodide ion with methyl bromide at 50°C is 7.63×10^4 J/mol. Calculate the rate constant for the Rx^n ($A = 1.66 \times 10^{10} L mol^{-1} S^{-1}$).
19. $t_{1/2}$ is 100 min . at certain conc. , when conc. is reduced to half then $t_{1/2}$ become 200 min. Find the order of reaction.
20. $t_{1/2}$ for a reaction is 600 sec. What percent of A remains & decompose after 30 mint.

SURFACE CHEMISTRY



1. What is the difference between physisorption and chemisorption?
2. What is an adsorption isotherm? Describe Freundlich adsorption isotherm.
3. Why is adsorption always exothermic?
4. How are the colloidal solutions classified on the basis of physical states ?
5. What are lyophilic and lyophobic sols? Give one example of each type. Why are hydrophobic sols easily coagulated?
6. What is the difference between multimolecular and macromolecular colloids? Give one example of each. How are associated colloids different from these two types of colloids?
7. What are enzymes? Write in brief the mechanism of enzyme catalysis.
8. How are colloids classified on the basis of (i) Physical states of components (ii) Nature of dispersion medium and (iii) Interaction between dispersed phase and dispersion medium?
9. Explain what is observed (i) When a beam of light is passed through a colloidal sol. (ii) An electrolyte, NaCl is added to hydrated ferric oxide sol. (iii) Electric current is passed through a colloidal sol?
10. What are emulsions . Give their types? What is demulsification? Name two demulsifiers.
11. Action of soap is due to emulsification and micelle formation. Comment.
12. What do you mean by activity and selectivity of catalysts?
13. Describe some features of catalysis by zeolites. What are shape selective catalysts?
14. Explain the following terms: (i) Electrophoresis (ii) Coagulation (iii) Dialysis (iv) Tyndall effect. (v) Colloidion
15. What are micelles? Give an example of a micellers system.
16. Explain the terms with suitable examples: (i) Alcosol (ii) Aerosol (iii) Hydrosol
17. Comment on the statement that "colloid is not a substance but a state of substance".
18. Why is the ester hydrolysis slow in the beginning and becomes faster after sometime? Ester hydrolysis can be represented as: Ester + water \rightarrow Acid + Alcohol
19. What modification can you suggest in the Hardy-Schulze law
20. Why is ferric chloride preferred over potassium chloride in case of a cut Leading to bleeding?
21. Why sky looks blue to us. [CBSE SAMPLE PAPER]
22. Explain the Formation of delta.
23. Explain a freshly formed precipitate of ferric oxide can be converted to a colloidal sol by shaking it with a small quantity of ferric chloride. [CBSE SAMPLE PAPER]
24. Name the potential difference between the fixed layer and the diffused layer of opposite charge.
25. A colloidal solution of AgI is prepared by two different methods. (A) AgNO₃ solution is added to excess KI solution. (B) KI solution is added to excess AgNO₃ solution. What is the charge on the Ag I colloidal particles in the two cases. Explain. [CBSE SAMPLE PAPER]
26. Most effective electrolyte causing the coagulation of Fe₂O₃.H₂O/Fe³⁺ is -
a) MgCl₂ b) KCl c) K₄ [Fe(CN)₄] d) AlCl₃ [CBSE SAMPLE PAPER]
27. Explain the terms (a) Tyndall effect [2010, 2011, 2011C] (b) coagulation? [2009, 2010] (c) Electrophoresis [2011C] (d) Peptization [2010] (e) reversible sols [2010] (f) Brownian movement (g) Hardy Schulze rule (h) Colloidion [Sample Paper]
28. Adsorption of a gas on the surface of solid is generally accompanied by a decrease in entropy. Still it is spontaneous process. Explain [CBSE SAMPLE PAPER]
29. (i) Why is alum added to water for purification ? (ii) Explain why deltas are formed where river & sea water meet. (iii) Cottrell's smoke precipitator is fitted at the mouth of the chimney used in factories.
30. What do you understand by Kraft temperature and CMC in colloids? What is CMC value for soap solution?

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GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

1. Write short notes on Zone refining and Liquation ?.
2. What is Van arkel & Monds process of refining metal? Explain by giving an example.
3. Which is better reducing agent at 710°C ,C or CO ?
4. Name the reducing agent used in aluminiothermic process.
5. What is meant by chromatography?
6. State the role of Silica in metallurgy of Copper?
7. Why copper matte is put in Silica lined of Aluminum?21
8. Copper and silver are below hydrogen electrochemical series and yet they are found in the combined state as sulphide in nature comment.
9. Indicate the temperature at which carbon can be used as reducing agent for FeO .
10. Is it true under certain conditions Mg can reduce SiO_2 and Si can reduce MgO ? What are those conditions?
11. What is the thermodynamic consideration in the choice of a reducing agent in metallurgy?
12. Although thermodynamically feasible in practice magnesium metal is not used for the reduction of alumina in the metallurgy of aluminium. Why?
13. How is leaching carried out in case of low grade copper ores ?
14. Write down the reactions taking place in different zones in the blast furnance during the extraction of iron.
15. How is Cast Iron is different from Pig Iron?
16. What is the significance of leaching in the extraction of the Aluminum?
17. Cu can be extracted by hydrometallurgy but not Zn, Explain?
18. Is it true that under certain condition Mg can reduce SiO_2 and Si can reduce MgO , what are those conditions?
19. What is the role of depressant in froth floatation process?
20. Why is pine oil used in froth floatation process?
21. What is the role of cryolite in the metallurgy of aluminium?
22. What is the role of graphite rod in the electrometallurgy of aluminium?
23. Why is aluminium used for electric cables though it is relatively less conducting than copper?
24. Name three main varieties of iron. Which out of them is the purest?
25. Why do blisters generally appear when molten copper is allowed to cool in bessemer converter?
26. Why can alumina not be reduced by carbon?
27. Give the principle of 'magnetic separation' method of refining of metals.

HALOALKANES & HALOARENES



1. What is meant by (a) Walden Inversion (b) Racemic mixture?
2. Why is Sulphuric Acid not used during the reaction of alcohols with KI?
3. Out of $C_6H_5CH_2Cl$ and $C_6H_5CHClC_6H_5$, which is more easily hydrolysed by KOH?
4. How can iodoform be prepared from (a) ethanol (b) Acetaldehyde?
5. Describe laboratory preparation of Chloroform. Why is it stored in dark coloured bottles?
6. What is Phosgene? & How phosgene can be removed?
7. Convert: (i) Benzene to p-nitrochlorobenzene (ii) Chlorobenzene to Phenol
8. Primary alkyl halide C_4H_9Br (A) reacted with alcoholic KOH to give compound (B). Compound B is reacted with HBr to give C which is an isomer of A. When A is reacted with sodium metal it gives compound D C_8H_{18} that was different from the compound formed when n-butyl bromide is reacted with sodium. Give the structural formula of A and write the equations for all the reactions.
9. Explain why the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride?
10. Explain why Grignard reagent should be prepared under anhydrous conditions.
11. Arrange the compounds of each set in order of reactivity towards SN_2 & SN displacement:-
(I) 2-Bromo-2-methylbutane, 1-bromopentane, 2-Bromopentane
(II) 1-Bromo-3-methylbutane, 2-Bromo-2-methylbutane, 3-Bromo-2-methylbutane
(IV) The 4 isomeric bromobutanes (V) Vinyl chloride, Benzyl chlorides, isopropyl bromide.
12. An alkyl chloride A on reaction with magnesium in dry ether followed by treatment with ethanol gave 2-methylbutane. Write all the possible structures of A.
13. The nucleophilic substitution of primary alkyl chlorides with sodium acetate is catalysed by sodium iodide. Explain why?
14. p-Methoxybenzyl bromide reacts faster than p-nitrobenzyl bromide with ethanol to form an ether product. Explain why.
15. How will you distinguish between :-
(i) Propan-1-ol and Propan-2-ol? (ii) Methylamine (CH_3NH_2) and Dimethylamine [$(CH_3)_2NH_2$]
16. What happens when :-
(i) Bromobenzene is treated with Mg in the presence of dry ether?
(ii) Chlorobenzene is subjected to hydrolysis
17. An excess of methyl magnesium iodide reacts with 0.6g of an organic compound $C_3H_6O_3$ to evolve 295.7 ml of methane gas at STP? Calculate the number of active hydrogen atoms in the molecule of organic compound?
18. Explain why :-
(i) Vinyl Chloride is unreactive in nucleophilic substitution reactions?
(ii) neo-pentyl bromide undergone nucleophilic substitution reaction are very slowly?
19. Which of the following compounds will give positive iodoform test :-
(i) Butan-1-ol (ii) Butan-2-ol (iii) Tert-butanol
20. Why are Haloalkanes more reactive towards nucleophilic substitution reactions than Haloarenes?
21. How will you bring about the following conversions :
i) Chlorobenzene to p-nitrophenol ii) Toluene to Benzyl alcohol iii) Ethanol to Propanenitrile
iv) Benzene to 4-bromonitrobenzene v) Ethyl chloride to Propanoic acid
22. p-dichlorobenzene has higher M.P and solubility than those of o- and m-isomers. Discuss.

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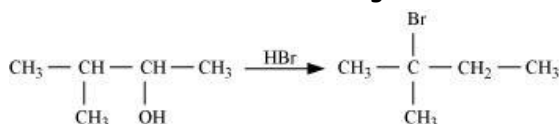
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ALCOHOLS, PHENOLS AND ETHERS

- Why o-nitrophenol has lower boiling point than p- nitrophenol. Which can be steam distilled?
- Give chemical test to distinguished between phenol and benzoic acid.
- How is phenol obtained from aniline ?
- How Phenol can be prepared by Cumene?
- How would you account for the following :
 - Phenols are much more acidic than alcohols.
 - The boiling points of ethers are much lower than those of the alcohols of comparable molar masses.
- Give an illustration of Reimer Tiemann reaction with mechanism ?
- Give the action of H_2SO_4 on ethanol in different condition , with mechanism?.
- Why is it that phenol is acidic and hexanol is neutral towards a solution of NaOH?
- What is Williamsons synthesis ? Also give its Limitation ?
- What happen when tert-butyl alcohol is treated with Cu at 573 K ?
- How will you distinguish between (a) Phenol & Benzyl alcohol (b) Phenol & Benzoic acid
- Give Kolbe's reaction , with mechanism ?
- Convert Phenol to Asprine?
- Phenol is less soluble in water than ethyl alcohol?
- Write a short note on (a) oxymercuration demercuration (b) Hydroboration.
- m-nitrophenol is less acidic than p-Nitrophenol & o-nitrophenol. Why?
- Why the reaction of Phenol with Bromine in aqueous & in non aqueous medium is different?
- When 3-methylbutan-2-ol is treated with HBr, the following reaction takes place:Give a mechanism for this reaction.



- Why tert-halides donot under go williamson's synthesis reaction?
- Why the reaction of ethers are catalysed by acid and not by base?
- Why old samples of ethers are not good for distillation?

ALDEHYDES, KETONES AND CARBOXYLIC ACIDS

- Mention one important tests to distinguish between Formic acid and Acetic acid
- Convert (a) Benzene to Benzoic acid
- Write a short note on - (a) Rosenmund reaction (b) Wolf kishner reaction (c) Clemmenson reaction (d) Perkins reaction (e) Benzoin condensation
- With mechanism explain - (a) Aldol condensation (b) Cannizaro reaction ?
- Why α -Hydrogen is acidic & Not the β -Hydrogen?
- What is - (a) Formalin (b) Silver mirror test (c) Formose
- Write the reaction in Following case -
 - CH_3CHO reacts with Ammonical solution of silver nitrate .
 - Benzaldehyde reacts with Tollen's reagent ?
 - CH_3CHO treated with Conc. NaOH (d) Butan-2-one is treated with dil. NaOH.

8. Give distinguishing test between - (a) HCOOH & CH_3COOH (b) CH_3CHO & $\text{C}_6\text{H}_5\text{CHO}$
(c) $\text{C}_6\text{H}_5\text{CHO}$ & $\text{C}_6\text{H}_5\text{CH}_2\text{CHO}$ (d) Butanal & Butan-2-one (e) Acetophenone and Benzophenone
(f) Benzaldehyde and Acetophenone
9. Explain during the preparation of esters from a carboxylic acid and an alcohol in the presence of an acid catalyst, the water or the ester should be removed as soon as it is formed.
10. Why is carboxyl group in benzoic acid meta directing? Support your answer with two examples.
11. Write structural formulae and names of the four possible aldol condensation products from propanal and butanal. In each case indicate which aldehyde acts as nucleophile and which as electrophile.
12. Although phenoxide ion has more number of resonating structures than carboxylate ion carboxylic acid is a stronger than phenol. Why?
13. Two moles of organic compound A on treatment with a strong base gives two compounds B and C. Compound B on dehydrogenation with Cu gives A while acidification of C yields carboxylic acid D Having molecular formula of CH_2O_2 . Identify the compounds A, B, C, and D.
14. Why pH should be maintained during the reaction of Ammonia derivative?
15. Explain the reaction of acetaldehyde with semicarbazide? With proper reason?
16. Give reason for the following Sodium bisulphate is used for the purification of aldehydes and ketones.
17. Why ketones are less reactive towards nucleophiles than aldehydes?
18. An organic compound 'A' (molecular formula $\text{C}_3\text{H}_6\text{O}$) is resistant to oxidation but forms a compound 'B' ($\text{C}_3\text{H}_8\text{O}$) on reduction. B reacts with HBr to form a bromide C which on treatment with alcoholic KOH forms an alkene D (C_3H_6). Deduce the structures of A, B, C, D
19. An organic compound A, Molecular Formula $\text{C}_9\text{H}_{10}\text{O}$ forms 2,4 DNP derivative, reduces Tollens reagent and undergoes Cannizaros reaction. On vigorous oxidation it gives 1,2-benzene dicarboxylic acids. Identify A.
20. Carboxylic acid do not give reaction of aldehydes and ketones. Why?
21. Predict the product formed when cyclohexanecarbaldehyde reacts with following reagents.
(i) PhMgBr and then H_3O^+ (ii) Tollens reagent (iii) Semicarbazide and weak acid
(iv) Excess ethanol and acid (v) Zinc amalgam and dilute hydrochloric acid
22. Why is the boiling point of an acid anhydride higher than the acid from which it is derived?
23. Give plausible explanation for each of the following :
(i) Cyclohexanone forms cyanohydrins in good yield but 2,2,6-trimethylcyclohexanone does not.
(ii) There are two $-\text{NH}_2$ groups in semicarbazide. However only one is involved in the formation of semicarbazones.
(iii) During the preparation of esters from a carboxylic acid and an alcohol in the presence of an acid catalyst the water or the ester should be removed as soon as it is formed.
24. What is HVZ reaction? Convert Acetic acid to (a) Oxalic acid (b) Malonic acid
25. Give mechanism of esterification & Also explain Transesterification?
26. What is meant by saponification reaction & How can you say that glycerol is obtained as side product in soap industry?
27. Which is more acidic - (a) $\text{C}_6\text{H}_5\text{COOH}$ & Acetic acid (b) HCOOH & Acetic acid (c) Phenol & $\text{C}_6\text{H}_5\text{OOH}$

ORGANIC COMPOUNDS CONTAINING NITROGEN

- Arrange the following in order of decreasing basic strength
(a) Ethyl amine, Ammonia, Triethyl amine (b) Aniline, p- Nitroaniline , p- Toluidine
- Amine group in aniline is ortho and para directing. Why does then aniline on nitration give substantial amount of m-nitroaniline
- Primary amines have higher boiling points than tertiary amines. Why?
- 'Amide are more acidic than amines'. Why?
- Arrange the following amines in the ascending order of basic strength giving reason-
(a) EtNH_2 , Et_2NH , Et_3N , in aqueous solution?(b) MeNH_2 , Me_2NH , Me_3N , in aqueous solution?
- What is the function of acetanilide? How will you prepare (a) o-Bromo aniline (b) 2,4,6- tribromo aniline
- Ammonolysis of alkyl halide does not give a corresponding amine in pure state. Explain?
- Explain why methyl bromide reacts with KCN go give mostly methyl cyanide but it reacts with AgCN to give mostly methyl isocyanide.
- What is meant by (a) Schotten bouman reaction (b) Coupling reaction (c) Azo dye test
- Why does silver chloride dissolve in aqueous methyl amine solution?
- Convert - (a) Benzamide to aniline (b) Aniline to benzamide (c) Aniline to benzene iso cyanide
- Give a chemical test to distinguish between aniline and ethylamine.
- How is m-nitroaniline obtained from nitrobenzene? What is meant by selective reduction?
- Write the chemical equations for the following chemical reactions: A pure primary amine is prepared from a primary alkyl halide.
- Define Zwitter in ? What is the structural formula of the zwitter ion formed from Aniline?
Why Zwitter ion has two pK values?
- Write the chemical reaction occurring in the preparation of fluorobenzene from aniline.
- How will you distinguish between followings - (a) $\text{CH}_3\text{CH}_2\text{NH}_2$ & $\text{CH}_3\text{-NH-CH}_3$ (b) CH_3NH_2 & $\text{C}_6\text{H}_5\text{NH}_2$
- Why does aniline on nitration gives a substantial amount of m- nitroaniline?
- Write reactions of the final alkylation product of aniline with excess of methyl iodide in the presence of sodium carbonate solution.
- Why cannot aromatic primary amines be prepared by Gabriel phthalimide synthesis?
- What is Hinsberg reagent ?
- Give reasons for the following: Sulphanilic acid I insoluble in water but is soluble both in aqueous bases and aqueous mineral acids taken separately.

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POLYMERS

1. Explain the difference between Buna-N and Buna - S?
2. Define (a) homopolymer (b) Copolymer (c) Step growth polymer (d) Elastomer (e) Thermosetting (f) Thermoplastic polymer (g) Copolymer?
3. Write monomers & Reactions for (a) Bakelite (b) Novolac?
4. Urea and Formaldehyde are the monomers of which polymer?
5. What is Glyptal?
6. Write the structure of monomer used in the preparation of Teflon?
7. How does vulcanization change the character of natural rubber?
8. Prepare Nylon - 6 from suitable monomer?
9. Give example of Biodegradable polymer?
10. Define Chain growth polymerization?
11. What are biodegradable polymers?
12. How is terylene synthesized?
13. What are the different ways of initiating addition polymerization?
14. How can you differentiate between addition and condensation polymerization?
15. Discuss the main purpose of vulcanization of rubber?
16. Why free radical polymerization stops by addition of Benzoquinone?
17. Which type of polymerization takes place in followings - (a) Acrylonitrile (b) Polystyrene
18. What are chain Transfer & Chain inhibiting agents?



CHEMISTRY IN EVERYDAY LIFE

1. Name two narcotics which are used analgesic?
2. Why is Bithional is added to soap?
3. What is meant by spectrum of antibiotic? Give example of Broad spectrum antibiotic?
4. What is - (a) Tincture of Iodine (b) Dettol
5. Name one medicinal compound used to treat hypertension?
6. What are food preservatives? Why they are called as Sacrificial particals?
7. Name two antioxidants used to preserve wine and beer.
8. What is the use of - (a) Equanil (b) Morphin (c) Ranitidin (d) Sucralose
9. Whenever a doctor prescribes a medicine of aspirin content directs patient not to take in empty stomach. Why?
10. What is the role of BHA & BHT? Also give their full name.
11. In which condition a substance can act as antibiotic & Disinfectant? Name a substance which can be used as antiseptic and disinfectant?
12. While antacids and antiallergic drugs interfere with the function of histamines, why do these not interfere with the function of each other?
14. Low level of noradrenaline is the cause of depression. What type of drugs is needed to cure this problem? Name two drugs.
15. Why are cimetidine and ranitidine better antacids than sodium hydrogen carbonate or magnesium hydroxide or Aluminum hydroxide?
16. What Problem arise in using Alitam as Artificial Sweetener?
17. Explain the following terms with suitable example - (a) Cationic detergent (b) Anionic detergent (c) Non-ionic detergents.

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THE d AND f BLOCK ELEMENTS

1. What is pyrophoric alloy & Misch metal ?
2. Why are the compounds of transition metals generally coloured?
3. Why transition metal makes them good catalyst ?
4. Why is transition metals shows high enthalpy of atomisation?
5. What are coinage metals?
6. Name the metal that is refined by Mond's process?
7. Why is Cu considered as a transition metal?
8. Write chemical equation for the reactions involved in manufacture of KMnO_4 from pyrolusite ore ?
9. What is meant by Lanthanoids contraction. Give its consequence?
10. Describe with chemical equation the step involved in the preparation of potassium dichromate from sodium chromate?
11. Why transition metal _ (a) Form Alloys (b) Form Interstitial compounds (c) Possess Paramagnetic character (d) act as Catalyst
12. Which is stronger reducing agent Cr^{2+} or Fe^{2+} and why?
13. Actinoid contraction is greater than Lanthanoid contraction and why?
14. Explain why Cu^{2+} is stable in aqueous solution?
15. (i) Give the balanced chemical equation of two reaction in which KMnO_4 acts as an oxidising agent in the acidic medium
(ii) Why Lanthanides have less tendency of complex formation?
16. How would you account for the following:
 - (i) Of the d^4 species, Cr^{2+} is strongly reducing while manganese(III) is strongly oxidising.
 - (ii) Cobalt(II) is stable in aqueous solution but in the presence of complexing reagents it is easily oxidised.
 - (iii) The d^4 configuration is very unstable in ions.
17. Give examples and suggest reasons for the following features of the transition metal chemistry:
 - (i) The lowest oxide of transition metal is basic, the highest is amphoteric/acidic.
 - (ii) A transition metal exhibits highest oxidation state in oxides and fluorides.
 - (iii) The highest oxidation state is exhibited in oxoanions of a metal.
18. Comment on the statement that elements of the first transition series possess many properties different from those of heavier transition elements.
19. Describe the oxidising action of potassium dichromate and write the ionic equations for its reaction with: (i) iodide (ii) iron(II) solution and (iii) H_2S
20. Describe the preparation of potassium permanganate. How does the acidified permanganate solution react with (i) iron(II) ions (ii) SO_2 and (iii) oxalic acid? Write the ionic equations for the reactions.
21. Why $\text{Na}_2\text{Cr}_2\text{O}_7$ is not used for titrations?
22. Why $\text{Cr}_2\text{O}_7^{2-}$, CrO_4^{2-} & MnO_4^- shows colour ?

COORDINATION COMPOUNDS

1. Write ionization isomers of $[\text{Co}(\text{NH}_3)_5 \text{Br}] \text{SO}_4$ & $[\text{Co}(\text{NH}_3)_4 \text{Cl}_2] \text{Br}$. Give one test to distinguish their isomers?
2. Define - (a) co-ordination number (b) Chelating ligand (c) Bridge Ligand (d) Homoleptic complex (e) CFSE (f) Denticity ?
3. What is the difference between double salt and complex compound?
4. Name the metal present in chlorophyll and haemoglobin?

5. Give an example of (a) Bidentate ligand (b) hexadentate ligand?
6. Give an example of chelate complexes?
7. Write the name of didentate ligand?
8. How many isomers are there for octahedral complex $[\text{CoCl}_2(\text{en})(\text{NH}_3)_2]$?
9. How is magnitude of Δ_o affected by nature of ligand and oxidation state of metal ion?
10. Using the valence bond approach predict the shape and magnetic character of-
 $[\text{Fe}(\text{CN})_6]^{-4}$, $[\text{Fe}(\text{F})_6]^{-4}$, $[\text{Ni}(\text{CO})_4]$
11. What type of isomerism is exhibited by $[\text{Co}(\text{NH}_3)_4\text{Cl}_2] \text{Br}$? Write the structures of the possible isomers and the state of hybridization of the central metal atom?
12. Predict the shape and magnetic character of each of the following :-
(a) $[\text{Cr}(\text{NH}_3)_6]^{3+}$ (b) $[\text{Cr}(\text{CO})_6]$ (Atomic number of Cr = 24)
13. Write the structures of a pair of complexes showing geometrical isomerism?
14. Explain crystal field theory? What are Low field and High field complex
15. What are (a) Hypo ligate complex (b) Hyper ligate complex?



BIOMOLECULES

1. Give differences between DNA & RNA?
2. Define Anomers & Epimers? Give examples of anomers?
3. Which type of bonds are responsible for secondary structure of protein?
4. Why cannot vitamin C be stored in our body?
5. Enumerate the reaction of D-glucose which cannot be explained by its open chain structure?
6. State two differences between globular and fibrous protein?
7. What are essential and non essential amino acids?
8. Explain the term mutarotation, giving an example?
9. Describe two important functions of nucleic acids?
10. How do you explain the absence of aldehyde group in penta acetate glucose?
11. The melting points and the solubility in water of amino acids are generally higher than the corresponding halo acids why explain?
12. What are reducing and non reducing sugar?
13. Why Sucrose is a non-reducing sugar?
14. Why Glucose & fructose form same osazone?
15. How do you explain the amphoteric behavior of amino acids?
16. Define vitamins and state their classifications?
17. Name the main diseases caused due to lack of Vitamin K & Vit. C and its source in A, B, C & K?
18. Give the products of hydrolysis of (a) maltose (b) Lactose
19. What happens when D-Glucose is treated with the following reagents :-
(a) HI (b) Bromine water (iii) NH_3 (iv) Ammonical silver nitrate
20. Define :- (a) Co-enzymes (b) Cofactor (c) Peptide linkage (d) Glycosidic bond.
21. What do you mean by renaturation and denaturation of proteins?
22. Where all water of egg goes on heating?



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SURFACE CHEMISTRY

1. Explain how activated charcoal adsorbs organic dye.
2. Adsorption is always exothermic in nature. Comment.
3. (a) Adsorption of a gas on the surface of solid is generally accompanied by a decrease in entropy. Still it is a spontaneous process. Explain.

-) How does an increase in temperature affect both physical as well as chemical adsorption?
- Define coagulation value? If the flocculation values of NaCl and AlCl_3 are respectively 52 and 0.093, compare their coagulating powers.
 - What happens when a freshly ppt $\text{Fe}(\text{OH})_3$ is shaken with little dil. FeCl_3 solⁿ? Explain with possible rxⁿ.
 - A methanol poisoned patient is treated by giving intravenous infusion of dil. ethanol. Explain. [Hint: Influence of inhibitors]
 - SnO_2 forms a positively charged colloidal sol in acidic medium & negatively charged sol in basic medium. Explain.
 - Explain why: (i) At sunset an orange colour develops in the sky. (ii) Bleeding due to a small cut can be stopped by rubbing alum. (iii) Activated charcoal is used in gas masks used by coal miners. (iv) Delta formation.
 - What modification can you suggest in the Hardy-Schulze law?
 - What is the difference between physisorption and chemisorption? Also define Adsorption Isotherm & Isobar?
 - Explain what is observed- (i) When a beam of light is passed through a colloidal sol. (ii) An electrolyte, NaCl is added to hydrated ferric oxide sol. (iii) Electric current is passed through a colloidal sol?
 - What do you mean by (a) activity and selectivity of catalysts (b) Emulsifier (c) Demulsification?
 - Why is ferric chloride preferred over potassium chloride in case of a cut leading to bleeding?
 - (a) why sky looks blue to us. (b) Explain the Formation of delta. (c) Freundlich's equation
 - Explain a freshly formed precipitate of ferric oxide can be converted to a colloidal sol by shaking it with a small quantity of ferric chloride.
 - Define Zeta Potential? or Name the potential difference between the fixed layer and the diffused layer of opposite charge.
 - A colloidal solution of AgI is prepared by two different methods. (A) AgNO_3 solution is added to excess KI solution. (B) KI solution is added to excess AgNO_3 solution. What is the charge on the Ag I colloidal particles in the two cases. Explain.
 - Most effective electrolyte causing the coagulation of $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O} / \text{Fe}^{3+}$ is -
a) MgCl_2 b) KCl c) $\text{K}_4[\text{Fe}(\text{CN})_4]$ d) AlCl_3
 - (i) Why is alum added to water for purification?
(ii) Explain why deltas are formed where river & sea water meet.
(iii) Cottrell's smoke precipitator is fitted at the mouth of the chimney used in factories.
 - Define - (a) CMC (b) Kraft Temperature (c) Synerisis (d) Thixotropy (e) Gold number (f) Peptization (g) Tyndall cone (h) Protective colloids (i) Action of heterogeneous catalyst.
 - What happens to a gold sol if gelatin is added to it?
 - Comment on the statement that " Colloid is not a substance but it is state of substance ?
 - Gelatin is generally added to icecreams. Why?

THE p-BLOCK ELEMENTS

FOCUS POINTS

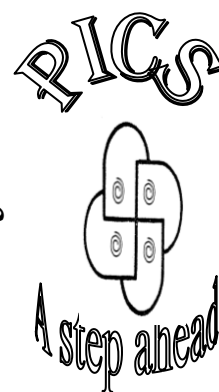
Preparation and reactions of $N_2, NH_3, PH_3, HNO_3, SO_2, H_2SO_4$ and Cl_2 ; Drawing Structures of Oxoacids of P, S, Cl and Xe-F compounds (Practice thoroughly by drawing), Reasoning questions.



- Why is the bond angle in PH_3 molecule lesser than that in NH_3 molecule.
- N_2 is a gas while P_4 is a solid.
- Why does PCl_3 fume in moist air?
- What is 'Super Halogen'? Why is it called so? Write equation what happens when it reacts with a cold dilute solution of sodium hydroxide.
- N_2 molecule is chemically inert while White Phosphorus is more reactive.
- PCl_5 is more covalent than PCl_3 .
- HNH bond angle in NH_3 is less than the tetrahedral bond angle of 109.5° .
- H_3PO_2 is a stronger reducing agent than H_3PO_3 .
- All Halogens are coloured.
- Oxygen and Chlorine have similar electronegativity. Oxygen forms hydrogen bonding but not Chlorine.
- HF has highest boiling point while HCl has lowest boiling point among hydrogen halides.
- HF is a liquid while other hydrogen halides are gases.
- Interhalogen compounds are more reactive than halogens from which they are formed.
- Xenon forms noble gas compounds.
- Fluorine forms fluoride of oxygen while other halogens form oxides of halogen.
- Fluorine forms only one Oxo acid.
- SF_6 is resistant to hydrolysis.
- Draw the structures of $P_4O_{10}, XeOF_4, Hypobromous\ acid, IF_7, ClF_5, Chlorous\ acid$ and Chloric acid.
- What is the Higher covalency of N? Why NCl_5 does not exist.
- Why F_2 has higher bond length than Cl_2 & O_2 ?
- Give structure of - (a) SF_4 (b) $XeOF_2$ (c) XeO_3 (d) BrO_3^- (e) I_3^-
- Why PCl_5 possess solid character? why it splits to give PCl_3 & Cl_2 ?
- What will be the action of Cl_2 with NaOH? How Cl_2 show bleaching behavior?
- Comment on bonding On SO_2 & SO_3 ?
- How you can say that H_2SO_4 is king of chemicals? How it can be diluted safely?
- How we can maximize the production of NH_3 by Haber's process?
- Comment on Neil Bartlett experiment?
- Bleaching of flowers by Cl_2 is permanent, by SO_2 it is temporary. Explain?
- $(SiH_3)_3N$ is a weaker base than $(CH_3)_3N$. Give reason.
- Define - (a) Interhalogen compounds (b) Pseudohalogen (c) Pseudohalide
- I_2 is less soluble in water, but solubility increases by addition of KI?
- Complete the following: I. $HNO_3 + P_4O_{10} \rightarrow$ II. $IO_3^- + I^- + H^+ \rightarrow$
III. $NH_3 + NaOCl \rightarrow$ IV. $SbCl_3 + H_2O \rightarrow$
- $(SiH_3)_3N$ is a weaker base than $(CH_3)_3N$. Give reason.
- CN^- ion is known but is CP^- not known. Give reason.

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