



StarTuition

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(FOR CBSE AND STATE BOARD, NEET & IIT-JEE)

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XI STANDARD

INORGANIC CHEMISTRY

1. CHEMICAL CALCULATIONS

I. Answer the following shortly

- Calculate the formula weights of the following compounds (2)
(a) CHCl_3 (b) $\text{C}_6\text{H}_{12}\text{O}_6$ (c) CH_3OH (d) NO_2 (e) PCl_3 (f) K_2CO_3
- What is Avogadro's number? (2)
- Define mole (3)
- Define molar mass (3)
- What is stoichiometry? (11)
- Define oxidation in terms of electronic concept (13)
- Define reduction in terms of electronic concept (14)
- Define oxidation number (14)
- Calculate the oxidation number of underlined elements in the following species. (15)
i. $\underline{\text{Mn}}\text{SO}_4$ ii. $\underline{\text{Cr}_2}\text{O}_7^{2-}$ iii. $\underline{\text{KMn}}\text{O}_4$
- Define strength. (20)
- Define molarity (20)
- Define molality (21)
- Define normality (20) *
- Define mole fraction (21).
- State volumetric analysis (25)
- What are the methods can be used to determine equivalent mass? (26)
- What is equivalent mass of acid? (28)
- What is equivalent mass of base? (29)
- What is equivalent mass of salt? (29)
- What is equivalent mass of oxidizing , reducing agent? (29)
- What is equivalent mass of reducing agent (30)
- Balance the following equations
i. $\text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbO} + \text{NO}_2 + \text{O}_2$
ii. $\text{KMnO}_4 + \text{HCl} \rightarrow \text{KCl} + \text{MnCl}_2 + \text{H}_2\text{O} + \text{Cl}_2$
- Define redox reaction (13)

II. Explain briefly on the following

1. Calculate Empirical formula and molecular formula (6) (Study all example and problem for practice)
2. What are the rules for writing stoichiometric equation (11)
3. How will you determine the equivalent mass of elements by hydrogen displacement method? (26)
4. How will you determine the equivalent mass of elements by oxide method? (27)
5. How will you determine the equivalent mass of elements by chloride method? (28)
6. How will you calculate the molecular mass of a volatile compound using Victor Meyer's method? (31)
7. Write the general rules for assigning oxidation number of an atom. (14)
8. Determine the molecular mass by Victor-Meyers method. (31)

PROBLEMS

01. Calculate the oxidation number of underlined elements in the following species.

- (a) $\underline{C}O_2$ (b) $\underline{Cr}_2O_7^{2-}$ (c) \underline{Pb}_3O_4 (d) $\underline{P}O_4^{3-}$ (e) $\underline{Mn}SO_4$
 (f) $\underline{S}_2O_3^{2-}$ (g) $\underline{H}NO_3$ (h) $\underline{KMn}O_4$ (i) $\underline{N}H_4^+$

02. Balance the following equations:

- (i) $Fe + H_2O \rightarrow Fe_3O_4 + H_2 \uparrow$
 (ii) $Fe_2(SO_4)_3 + NH_3 + H_2O \rightarrow Fe(OH)_3 + (NH_4)_2SO_4 \uparrow$
 (iii) $KMnO_4 + H_2SO_4 \rightarrow K_2SO_4 + MnSO_4 + H_2O + O_2$

03. What is the simplest formula of the compound which has the following percentage composition carbon 80%, Hydrogen 20%?

04. A compound on analysis give the following percentage composition C = 54.54%, H = 9.09%, O = 36.36%, find its empirical formula.

05. An organic compound was found to have contained Carbon = 40.65%, Hydrogen = 8.55%, and Nitrogen = 23.7%. Its vapour density was found to be 29.5. What is the molecular formula of the compound?

06. A compound contains Carbon = 32%, Hydrogen = 4%, and rest Oxygen. Its vapour density is 75. Calculate the empirical and molecular formula.

07. An acid of molecular mass 104 contains 34.6% carbon, 3.85% hydrogen and rest oxygen. Calculate the molecular formula of the acid.

08. What is the simplest formula of the compound? which has the following percentage composition; carbon 80%, hydrogen 20%, if the molecular mass is 30, calculate its molecular formula.

09. In the determination of molecular mass by Victor-Meyer's Method 0.790 g of a volatile liquid displaced $1.696 \times 10^{-4} m^3$ of moist air at 303K and at $1 \times 10^5 Nm^{-2}$ pressure. Aqueous tension at 303K is $4.242 \times 10^3 Nm^{-2}$. Calculate the molecular mass and vapour density of the compound.

2. GENERAL INTRODUCTION TO METALLURGY**I. Answer the following shortly**

1. Distinguish between ore and mineral with suitable example (37)
2. What are the different method of concentration of ore? (40)
3. What is gravity separation? (40)
4. Define metallurgy (42)
5. What is roasting? (42)
6. What are the major steps involved in the metallurgical process? (42)
7. What is calcinations? Give example (43) *
8. What is anode mud? (45)
9. How is copper metal is purified by electrolytic method? (45)
10. Define Gangue. (37)
11. What are the elements obtained from sea water? *
12. What is smelting? (43)
13. What are the sources obtained from earth? (39)
14. What are the steps involved in metallurgical process? (39)

II. Explain elaborately on the following

1. Explain froth floatation process with neat diagram. (40)
2. How electromagnetic separation process is useful in the separation of magnetic impurities from non magnetic ores? Draw the diagram. (41) *
3. How the impurities of ore are removed by chemical method? (41)
4. What is roasting? Explain the process with example. (42)
5. Explain about Bessimerisation process. (44)
6. What is zone refining ? Explain the process. (46) *
7. How nickel is extracted by Mond's process? (47)

3. ATOMIC STRUCTURE –I**I. Answer the following shortly**

1. What is the charge of an electron, proton and neutron. (50)
2. What is atomic number? (52)
3. What is Zeeman effect? (54)
4. What is stark effect? (54)
5. What is the total number of orbital's associated with the principal quantum number $n = 3$? (56)
6. Define orbital.
7. State Pauli's exclusion principle. (58)
8. State Hund's rule. (59)
9. Give the electronic configuration of chromium and copper. (61)
10. State Aufbau Principle. (59)
11. What is mass number? (51)

12. Write the defects of Rutherford model.
13. What are quantum numbers? (54)
14. Write the significance of quantum number. (54)
15. Write the shapes of s, p, d, f orbitals. (57)

II. Explain elaborately on the following

1. What are the postulates of Bohr's theory of atom? (52)
2. Explain the various types of quantum numbers. (54)
3. Discuss the shapes of s, p and d orbitals (57)
4. Explain Aufbau principle. (59) *
5. Write a short note on Thomson model of an atom. (50)
6. Write the postulates of Rutherford experiment. (51)

4. PERIODIC CLASSIFICATION

I. Answer the following shortly

1. State Newland law of octaves (67)
2. State Mendeleev's periodic law (67)
3. State modern periodic law? (69)
4. Name any two transition elements and any two inner transition element (70)
5. Why do elements in the same group have generally similar properties? (75)
6. Name the different blocks of elements in periodic table. Give the general electronic configuration of each block. (76)
7. What are atomic and ionic radii? How it is varied in a group and period? (78)
8. Why Cl^- ion is bigger than Cl atom. (81)
9. Define ionization energy. How it is varied in a group and period? (81)
10. Compare ionization energy of Li and Be
11. Why boron has lower ionization energy than Beryllium? (88)
12. Why nitrogen has higher I.E value than oxygen?
13. Out of fluorine and chlorine, which has greater electron gain enthalpy? (85)
14. Define electron affinity. How it is varied in a group and period? (84)
15. Why noble gases have zero electron gain enthalpy? (85)
16. Electron affinity of Be and Mg is zero. Why? (89)
17. What Dobereiner's triads? Give examples
18. What is group? Give an example.
19. What is period? Give an example.
20. Write general electronic configuration of s, p, d and f block elements.

II. Explain elaborately on the following

1. What are the essential features of the periodic table of Mendeleev? Discuss how is table has been modified subsequently (68)
2. Explain how the elements are arranged in the form of periodic table (69)

3. Define transition elements. Name the different transition series. (76)
4. Explain the factors which influence ionization enthalpy. (83)
5. What are the differences between electron gain enthalpy and electro negativity? (87)
6. What do you mean by the term electron affinity? How does electron affinity change along a period and in a group.(84)

5. GROUP 1S BLOCK ELEMENTS

I. Answer the following shortly

1. What are isotopes? Mention the isotopes of hydrogen. (96)
2. Mention the uses of deuterium. (99)
3. How is tritium prepared? (99)
4. How do you convert para hydrogen and ortho hydrogen? (101)
5. How does heavy water react with metals? (103)
6. How is hydrogen peroxide prepared in the laboratory? (104)
7. Mention the uses of hydrogen peroxide.(106)
8. Mention the characteristics of alkali metals. (107)
9. Why alkali metals have low melting and boiling point (108)
10. Mention the uses of lithium (109)
11. What are the uses of sodium? (112)
12. What is protium? (97)
13. What is Deuterium? (97)
14. Write the preparation of heavy water. (101)
15. What is tritium?
16. List the uses of heavy water. (103)
17. Discuss the electrolysis of water. (98)
18. Explain the three types of hydrogen (97)
19. Write the addition of deuterium to ethane. (97)
20. Write the conversion of para into ortho hydrogen (99)
21. Why are Cs and K used as electrodes in photoelectric cells?

II. Explain elaborately on the following

1. Write about the exchange reaction of deuterium. (99)
2. Draw the structure of ortho and para hydrogen and explain (100)
3. Differentiate between ortho and para hydrogen (100)
4. Explain the preparation of heavy water (101)
5. Explain reducing property of hydrogen peroxide. (105)
6. How liquid hydrogen can be used as a fuel? Explain (106)
7. How is sodium extracted? Explain with a diagram (110)
8. Differentiate water from heavy water. (102)
9. Write characteristics of alkali metal (107)

10. How deuterium is prepared by diffusion process. (97)
11. Explain laboratory preparation of hydrogen peroxide. (104)

PROBLEMS

1. An element occupies group number 1 and period number 3. This element heated in air gives compound A, with water it gives compound B a strong base. With ammonia gives compound C, which is used as a reducing agent in organic chemistry. Identify the element A, B and C.
2. An isotope of hydrogen reacts with oxygen to give compound (A), which is used as a moderator in nuclear reactor. Like hydrogen, this isotope also undergoes addition reaction. It reacts with ethylene to give compound B, which is a saturated hydrocarbons. Identify the element A and B. A is radioactive.
3. An isotope of hydrogen is prepared by bombarding beryllium with deuterons. It decays to an element A, with the emission of beta radiation. Identify the isotope and the element A.
4. A deuterium compound (A) which is used as a moderator in nuclear reactor reacts with Ca to form compound B, A reacts with SO₂ to give compound C. Upon electrolysis compound a gives deuterium molecule. Identify A, B and C.
5. An element occupies group number 1 and period number 2. This element burns with air and forms compound A. With, it gives compound B, with hydrogen it forms as ionic compound C. Identify the elements A, B, and C.
6. Compound B is obtained when element A reacts with CO₂. A reduces CO₂ to (C). A imparts yellow flame in bunsen burner? Identify A, B and C.
7. A metal 'A' burns air above 450 K to give B and C. 'A' also composes cold water to give 'D' liberates H₂. Identify A,B, C and D. A imparts crimson red colour to flame.
8. An element occupies group number 1 and period number 3. This element heated in air gives compound A, with water it gives compound B a strong base. With ammonia gives compound C, which is used as a reducing agent in organic chemistry. Identify the element A, B and C.
9. An isotope of hydrogen reacts with oxygen to give compound (A), which is used as a moderator in nuclear reactor. Like hydrogen, this isotope also undergoes addition reaction. It reacts with ethylene to give compound B, which is a saturated hydrocarbons. Identify the element A and B. A is radioactive.
10. An isotope of hydrogen is prepared by bombarding beryllium with deuterons. It decays to an element A, with the emission of beta radiation. Identify the isotope and the element A.
11. A deuterium compound (A) which is used as a moderator in nuclear reactor reacts with Ca to form compound B, A reacts with SO₂ to give compound C. Upon electrolysis compound a gives deuterium molecule. Identify A,B and C.

12. An element occupies group number 1 and period number 2. This element burns with air and forms compound A. With, it gives compound B, with hydrogen it forms as ionic compound C. Identify the elements A, B, and C.

13. Compound B is obtained when element A reacts with CO_2 . A reduces CO_2 to (C). A imparts yellow flame in bunsen burner? Identify A, B and C.

14. A metal 'A' burns air above 450K to give B and C. 'A' also composes cold water to give 'D' liberates H_2 . Identify A,B, C and D. A imparts crimson red colour to flame.

6. GROUP 2S BLOCK ELEMENTS

I. Answer the following shortly

1. What are the diagonal relationship between Be and Al? (119)
2. What are the important ores of Magnesium? (119)
3. Write note on reducing properties of Magnesium. (121)
4. What is slaking of lime? (122)
5. How is Gypsum prepared? Mention its uses. (122)
6. How is plaster of paris prepared? (123)
7. What is quick lime? How it is prepared?
8. Write the uses of magnesium sulphate. (122)
9. Write the uses of magnesium. (122)
10. Write the uses of calcium hydroxide. (122)
11. What is Gypsum?
12. Give reason for the colour imparted to the flame by alkali metals
13. Name the alkaline earth metal used in radio therapy.
14. Give reason .the compounds of alkaline earth metals are less ionic than alkali metals
15. Why Be and Mg do not impart colour to the flame ?
16. How is Calcium Hydroxide (Slaked lime), $\text{Ca}(\text{OH})_2$ Prepared?
17. How does the of Hydration Enthalpy of alkaline earth metals vary & compare it with alkali metals
18. What is the colour imparted to the flame by Ca,Sr and Ba?

II. Explain elaborately on the following

1. How is magnesium extracted from its ore? (119)
2. What is plaster of paris? How it is prepared? Mention its uses. (122)

PROBLEMS

1. An element occupies group number 2 and period number 3. This element reacts with oxygen and nitrogen to form compound A and B. It is a strong electropositive metal so it displaces Ag from AgNO_3 solution. With concentrated nitric acid, it forms compound C. Identify the element, compound A,B and C.

- An element of group 2A does not impart any colour to the flame. 'A' reacts with halogens forming covalent halides 'B' has the highest ionization energy. Identify A and B.
- An element of group 2A gives a compound B with air. B reacts with Cl_2 to give C, which has bleaching action. B also reacts with moist HCl to give D but there is no action with dry gas. Identify A, B, C and D.

7. P- BLOCK ELEMENTS

I. Answer the following shortly

- Define Inter pair effect. (128)
- Discuss the nature of hydrides in P block elements (130)
- How will prepared Borax glass? (132)
- What are the uses of Borax (132)
- Why diamond is hard compared with graphite? (134)
- Mention the uses of Nitrogen compounds (140)
- How is nitric acid prepared in the lab? (140)
- What are acidic oxides? Give two examples(143)
- What are basic oxides? Give two examples (144)
- What are amphoteric oxides? Give two examples (144)
- Write note on peroxides. (144)
- Which is considered to "earth's protective umbrella"? (147)
- Mention the uses of ozone (146)
- What are CFC'S? Mention its environmental action. (148)
- Draw the resonance structure of Ozone. (147)
- Boron does not form B^{+3} ion. Why?
- Why ammonia has higher boiling point than PH_3 ?
- Write about basic character of oxides of p block element. How it is varied in group and period? (129)
- Write the uses of ozone. (146)
- How Borax bead test carried out? (146)
- What are allotropes? Give example.
- Why SiC is used as an abrasive? (137)

II. Explain elaborately on the following

- How borax bead test is helpful in identifying basic radicals in qualitative analysis? (133)
- Discuss the structural differences between diamond and graphite. (134)
- How is ammonia manufactured by Haber's process? (138)
- Write a short note on fixation of nitrogen. (139)
- How nitric acid is prepared by Ostwald process? (141)
- Explain the laboratory preparation of ozone. (145)
- Write the preparation of boron from borox. (130)

PROBLEMS

1. An element occupies group number 13 and period number 2 is a representative element of that group. It reacts with carbon dioxide and forms an oxide (A). (A) reacts with CuSO_4 to give blue beads (B). Identify the element, compound (A) and (B). Write the reaction.
2. BF_3 reacts with LiH and forms a compound A. The compound A reacts with water to give the compound B. A reacts with ammonia at 390K and forms C. Identify (A), (B) and (C).
3. An element occupies group number 15 and period number 2 reacts with hydrogen under high pressure and in the presence of a catalyst it forms a hydride (A). In the presence of excess of air and in the presence of platinum it forms an oxyacid (B). Identify the element, A and B.
4. An element occupies group No. 16 and period number 2. The element on passing through silent electric discharge forms (A). (A) also reacts with lead sulphide and forms (B). (A) also reacts with BaO_2 and forms (C). It reacts with H_2O_2 and forms (D). Identify the element (A), (B), (C) and (D).
5. An element occupies group No. 14 and period number 2 exists in different allotropic forms. One form of this element has lubricating property (A). Another form is the hardest substance (B). New allotropic form of this element is named as 'Buckyball' (C) and it is superconducting. Identify the element, (A), (B) and (C).

PHYSICAL CHEMISTRY

8. SOLID STATE-I

I. Answer the following shortly

1. Write the difference between amorphous and crystalline solid (153)
2. Define unit cell. Write any two characteristics. (156)
3. How many types of cubic unit cell exist? (158)
4. What are Miller indices? (161) *
5. What are anisotropic and isotropic? (153)
6. What is long range order?
7. What are compound oxides? Give example
8. Write about the crystal parameter (a) edges (b) faces (c) interfacial angle
9. What are the seven classes of unit cell? (158)
10. What is crystallography?

II. Explain elaborately on the following

1. Give the distinguishing features of crystalline solids and amorphous solids. (153)
2. Draw a neat diagram for sodium chloride structure and explain. (159)
3. Draw a neat diagram for cesium chloride structure and explain. (160)

PROBLEMS

1. How many atoms are there per unit cell in (i) simple cubic arrangement of atoms, (ii) body centred cubic arrangement of atoms, and (iii) face-centred cubic arrangement of atoms?

2. How do the spacings of the three planes (100), (101) and (111) of simple cubic lattice vary?
3. How do the spacings of the three planes (001), (011) and (111) of bcc lattice vary?
4. How do the spacings of the three planes (010), (110) and (111) of fcc lattice vary?

9. GASEOUS STATE

I. Answer the following shortly

1. Define Boyle's law and Charles's law. (171)
2. State Dalton's law of partial pressure. (175)
3. Define Graham's law of diffusion. (172)
4. What are the units of Vanderwaal's constants "a" and "b". (183)
5. Write the significance of Vanderwaal's constants. (184)
6. Write the limitations of Vanderwaal's equation. (185)
7. What is critical temperature (T_c)? (186)
8. What is critical pressure (P_c)? (186)
9. What is critical volume (V_c)? (186)
10. Define Joule Thomson's effect. (192)
11. What is meant by inversion temperature? (193)
12. What are the conditions for liquefaction of gases? (193)
13. State Charles law. (172)
14. What is effusion? (178)
15. Write an ideal gas equation (172)
16. What is diamagnetism? (195)
17. Write the limitation of Vanderwalls equation. (185)
18. Write about S.T.P (173)

II. Explain elaborately on the following

1. Explain Andrews Isotherm of Carbondioxide. (186)
2. Explain Thomson's experiment of carbondioxide. (187)
3. Describe Linde's process of liquefaction of gases. (194)
4. Describe Claude's process of liquefaction of gases. (195) *
5. Derive critical constant from Vanderwalls constant (188)
6. What are the causes of deviation of real gas from ideal behaviour? (179)

PROBLEMS

1. At 27°C , H_2 is leaked through a tiny hole into a vessel for 20 minutes. Another unknown gas at the same T and P as that of H_2 is leaked through the same hole for 20 minutes. After effusion of the gas, the mixture exerts a pressure of 6 atm. The H_2 content of the mixture is 0.7 moles. If volume of the container is 3 litres, what is the molecular weight of unknown gas?
2. Calculate the pressure exerted by 5 moles of CO_2 in 1 lit vessel at 47°C using Vander Wall's equation. Also report the pressure of gas if it behaves ideally in nature. Given that $a = 3.592 \text{ atm lit}^2 \text{ mol}^{-2}$, $b=0.0427 \text{ lit}^2 \text{ mol}^{-2}$.

3. Calculate the total pressure in 10 litres cylinder which contains 0.4 g of helium 1.6 g of oxygen and 1.4 g of nitrogen at 27°C. Also calculate the partial pressures of He gas in the cylinder. Assume ideal behaviour for gases $R = 0.082 \text{ L atm}^{-1} \text{ K}^{-1} \text{ mol}^{-1}$.
4. The critical constants for water are 374°C, 218 atm and $0.0566 \text{ lit mol}^{-1}$. Calculate a and b of water.
5. Vander Wall's constants in litre atmosphere per mole for carbon dioxide are $a = 3.6$ and $b = 4.28 \times 10^{-2}$. Calculate the critical temperature and critical volume of the gas $R = 0.0820 \text{ lit atm K}^{-1} \text{ mol}^{-1}$.
6. Calculate the partial pressure N_2 and H_2 in a mixture of two moles of N_2 and two moles of H_2 STP. If a gas diffuses at the rate of one-half as fast as O_2 , find the molecular mass of the gas.
7. 50 ml of gas A effuse through a pin-hole in 146 seconds. The same volumes of CO_2 under identical conditions effuse in 115 seconds. Calculate the molecular mass of A.
8. One mole of carbon-dioxide was found to occupy a volume of 1.32 litre at 48°C and at a pressure of 16.4 atm. calculate the pressure of the gas that would have been expected to behave ideally and non-ideally.
9. Vanderwaal's constants for hydrogen chloride gas are $a = 3.67 \text{ atm lit}^{-2}$ and $b = 40.8 \text{ ml mol}^{-1}$. Find the critical temperature and critical pressure of the gas.
10. The critical temperature of hydrogen gas is 33.2°C and its critical pressure is 12.4 atm. Find out the values of 'a' and 'b' for the gas.

VOLUME II

10. CHEMICAL BONDING

I. Answer the following shortly

1. What are the different types of chemical bonding? (5)
2. What is octet rule? Give an example (2)
3. What is meant by electrovalent bond? (3)
4. What is covalent bonding? (4)
5. What is Lattice energy? (7)
6. What is meant by hybridization? (25)
7. What is coordinate or dative bond? (27)
8. Write the difference between homonuclear and heteronuclear molecule (1)
9. What is ionic/ electrovalent bond? (3)
10. State Fajan's rule. (14)
11. Define Polarization. (14)
12. What is resonance? (25)
13. What is homo and hetero diatomic molecule? Give examples. (1)
14. How sigma and pi bond are formed?
15. Write are the important features of VSEPR theory. (17)
16. What are the factor influencing on lattice energy?
17. Give the structure and geometry of NH_3 , SF_6 and CH_4 based on VSEPR theory.

II. Explain elaborately on the following

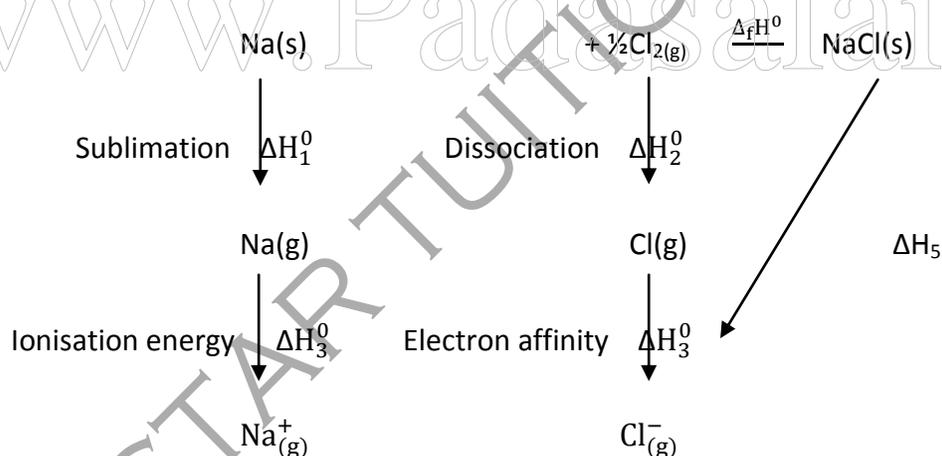
1. Calculate the lattice energy of NaCl using Born Haber cycle. (8)
2. Discuss the important properties of electrovalent compounds (11)
3. Explain the important properties of covalent compounds (13)
4. Discuss the partial covalent character in ionic compounds using Fajan's rule (14)
5. Discuss the shapes of the following molecules based on VSEPR theory NH₃, H₂O, SO₂, SF₆ (19) *
6. Explain resonance structure with suitable example. (25)
7. Draw the electron dot structure of F₂, CO₂ and N₂
8. Draw the Lewis dot structure of Cl₂, O₂, PH₃
9. Draw the resonance structure of the following O₃, CO₃²⁻, CO₂, N₂O

PROBLEMS

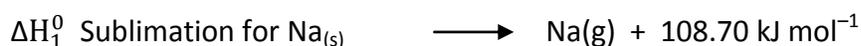
1. Calculate the lattice energy of NaCl using Born-Haber cycle.

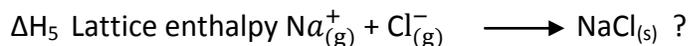
Calculation of lattice enthalpy of NaCl: Let us use the Born-Haber cycle for determining the lattice enthalpy of NaCl as follows:

The standard enthalpy change $\Delta_f H^0$ overall for the reaction.



The formation of NaCl can be considered in 5 steps. The sum of the enthalpy changes of these steps is considered equal to the enthalpy change for the overall reaction from which the lattice enthalpy of NaCl is calculated.





2. Calculate the lattice enthalpy of CaCl_2 given that the enthalpy of (i) Sublimation of Ca is 121 kJ mol^{-1} , (ii) Dissociation of Cl_2 to 2Cl is $242.08 \text{ kJ mol}^{-1}$, (iii) Ionisation of Ca to Ca^{2+} is 2422 kJ mol^{-1} , (iv) Electron gain for Cl to Cl^- is -355 kJ mol^{-1} , (v) $\Delta H_f^{(0)}$ overall is -795 kJ mol^{-1} .

11. COLLIGATIVE PROPERTIES

I. Answer the following shortly

1. What is colligative property? Mention them (31)
2. Define relative lowering of vapour pressure (33)
3. Define Raoult's law (32)
4. What do you understand by molal elevation of boiling point? (42)
5. Define osmosis and osmotic pressure (45)
6. What is Boyle's –Vont Hoff law (46)
7. What is Cherle's – Vont Hoff law (46)
8. What are the characteristics of osmotic pressure? (46)
9. What are isotonic solution? (46)
10. What are the advantages of Berkley Hartley method? (47)
11. Define VantHoff factor (48)

II. Explain briefly on the following

1. Explain the determination of relative lowering of vapour pressure by Ostwald walker method (34)
2. Explain the Beckmann thermometer method (39)
3. Describe the determination of depression in freezing point by Beckmann method (39)
4. Explain the determination of elevation of boiling point by Cottrell method (44)
5. Explain the laws of osmotic pressure and its determination by Berkley Hartley method (47)

PROBLEMS

1. What is the Vant Hoff factor for a solution of 1 M KCl solution? What is 85% dissociated?
2. A solution containing 6 gm of a solute dissolved in 250 ml of water gave an osmotic pressure of 4.5 atmosphere at 27°C . Calculate the boiling point of the solution. The molal elevation constant for water is 0.52.
3. The vapour pressure of CCl_4 at 30°C is 143 mm of Hg. 0.5 gm of a non-volatile non electrolyte substance with molar mass 65 is dissolved in 100 ml of CCl_4 . What will be the vapour pressure of the solution? Density of CCl_4 at 30°C = 1.58 gm per cc.

4. Dry air was passed successively through a solution of 5 gm of solute dissolved in 80.0 gm of water and through pure water. The loss in weight of the solution was 2.5 gm and that of the pure solvent was 0.04gm. What is the molecular weight of the solute?
5. Calculate the vapour pressure of the solution. The mole fraction of the solute is 0.25. The vapour pressure of the pure solvent is 0.8 atm.
6. 1.00g of a non-electrolyte dissolved in 50.5g of benzene lowered its freezing point by 0.40 K. The freezing point depression constant of benzene is $5.12 \text{ K kg mol}^{-1}$. Find the molecular mass of the solute.
7. What is the freezing point of solution containing 3g of non-volatile solute in 20g of water. Freezing point of pure water is 273 K. K_f of water = 1.86 K kg/mol . Molar mass of solute is 3000 g/mol.
8. A solution containing 2.5kg of a non-volatile solute in 100gm of benzene boiled at a temperature 0.42K higher than at the pure solvent boiled. What is the molecular weight of the solute? The molar elevation constant of benzene is $2.67 \text{ K kg mol}^{-1}$.
9. 0.900g of a solute was dissolved in 100ml of benzene at 25°C when its density is 0.879g/ml. This solution boiled 0.250°C higher than the boiling point of benzene. Molal elevation constant for benzene is $2.52 \text{ K Kg mol}^{-1}$. Calculate the molecular weight of the solute.
10. 10g of an organic substance when dissolved in two litre of water gave an osmotic pressure of 0.59 atm, at 7°C . Calculate the molecular weight of the substance.
11. A 0.5 percent aqueous solution of KCl was found to freeze at 272.76 K. Calculate Vant Hoff Factor and degree of dissociation of the solute at this concentration (K_1 for water = $1.86 \text{ K kg mol}^{-1}$). Normal molar mass of KCl = 74.5.
12. The depression in the freezing point of a benzene solution containing 0.784g of Acetic acid dissolved in 100 g of benzene is 0.35 K. Calculate the Van't Hoff factor and the degree of association of the solute at this concentration (K_f for benzene = $5.10 \text{ K kg mol}^{-1}$, molar mass of acetic acid is 60.01)
13. The vapour pressure of pure benzene at a certain temperature is 640 mm of Hg. A non-volatile non-electrolyte solid weighing 2.175 g is added to 39 g of benzene. The vapour pressure of the solution is 600 mm of Hg. What is the molecular weight of solid substance?
14. Calculate the freezing point of an aqueous solution of a non-electrolyte having an osmotic pressure 2.0 atom at 300 K. $K_f=1.86 \text{ K kg mol}^{-1}$.
 $R = 0.0821 \text{ lit atm k}^{-1} \text{ mol}^{-1}$
15. What might of non-volatile solute (urea) $\text{NH}_2 \text{ CO NH}_2$ needs to be dissolved in 100g of water in order to decrease the vapour pressure of water by 25%. What will be the molality of the solution?
16. 20g of sucrose solution is one litre is isotonic with a solution of boric acid containing 1.63 g of boric acid in 450 ml. Find the molecular weight of boric acid.

17. A solution containing 6 gm of a solute dissolved in 250 ml of water gave an osmotic pressure of 4.5 atmosphere at 27°C. Calculate the boiling point of the solution. The molal elevation constant for water is 0.52

12. THERMODYNAMICS-I

I. Answer the following shortly

1. What are homogeneous and heterogeneous system? (56)
2. What are intensive and extensive properties? (56)
3. Define adiabatic process (58)
4. Write the differences between endothermic and exothermic process (60)
5. Define zeroth law of thermodynamics (61)
6. Define first law of thermodynamics (64)
7. Define enthalpy (65)
8. Define enthalpy of combustion. (68)
9. Name the equipment using which heat of combustion of compounds are determined (68)
10. Define enthalpy of neutralization (70)
11. What is state function? Give examples (61)
12. What is path function? Give examples (61)
13. Define work
14. State the term (a) system (b) surrounding (c) boundary
15. What is isothermal process? (58)
16. What is adiabatic process? (58)
17. Write the various statements of first law of thermodynamics. (64)
18. What is degree of dissociation? List out its condition. (85)

II. Explain elaborately on the following

1. Distinguish between reversible and irreversible process (59)
2. Describe a bomb calorimeter and explain how heat of formation of an organic compound is determined (68)
3. Explain the different types of systems with examples.
4. Derive the relationship between enthalpy and internal energy.
5. Discuss the various processes involved in thermodynamics.
6. Write a note on enthalpy of neutralization.

PROBLEMS

1. Calculate the enthalpy of combustion of acetic acid (l) when burnt in excess of O₂ in a bomb calorimeter. Given that $\Delta_f H^\circ$, H₂O(l) = -285.84 kJ mol⁻¹ and $\Delta_f H^\circ$, CO₂(g) = -393.52 kJ mol⁻¹; $\Delta_f H^\circ$ CH₃COOH (l) = -463 kJmol⁻¹.



2. Heat of neutralisation of a weak acid HA by NaOH is - 12.13kJ mol⁻¹. Calculate the enthalpy of ionization of HA.

- ΔH for the reaction at 298K $\text{CO}_{(g)} + \frac{1}{2}\text{O}_{2(g)} \longrightarrow \text{CO}_{2(g)}$ is $282.85 \text{ kJmol}^{-1}$. Calculate ΔU of the reaction.
- From the following data at constant volume for combustion of benzene, calculate the heat of this reaction at constant pressure condition.
- Calculate the enthalpy of combustion of ethylene at 300K at constant pressure if its enthalpy of combustion at constant volume is -1406 kJmol^{-1} .
- (a) The measured heats of neutralization of acetic acid, formic acid, hydrocyanic acid and hydrogen sulphide are 13.20, 13.40, 2.90 and 3.80 K cal per g. equiv. respectively. Arrange these acids in a decreasing order of strength.
(b) Heat of neutralization of formic acid by NH_4OH is 11.9K cal per g. equiv. What is the heat of ionization of NH_4OH ?

PROBLEMS

- At 25°C K_c for the reaction $3\text{C}_2\text{H}_2(g) \rightleftharpoons \text{C}_6\text{H}_6(g)$ is 4.0. If the equilibrium concentration of C_2H_2 is 0.5 mol.lit^{-1} . What is the concentration of C_6H_6 ?
- Equivalent amounts of hydrogen and iodine are allowed to reach equilibrium at a given temperature $\text{H}_{2(g)} + \text{I}_{2(g)} \longrightarrow 2\text{HI}_{(g)}$. If 80% of the hydrogen can be converted to hydrogen iodide, what is the value of K_c and K_p at this temperature.
- At 100°C and 1 atm. pressure, the degree of dissociation of N_2O_4 is 0.9114. Calculate its equilibrium constant. What will be the degree of dissociation if temperature remains constant and pressure is doubled?
- In the reaction $\text{N}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{NO}_{(g)}$ at 298K, the partial pressures of $\text{NO}_{(g)}$, $\text{O}_{2(g)}$ at equilibrium are 0.9 and 0.01 atms respectively. Calculate the value of K_p .
- In the equilibrium reaction $\text{CO}_{2(g)} + \text{C}_{(g)} \rightleftharpoons 2\text{CO}_{(g)}$ the partial pressure of CO_2 , CO are 0.78 atm. and 1.22 atm respectively at equilibrium. Calculate the equilibrium constant.
- 64g of HI are present in 2 litre vessel. What is the active mass of HI?

13. CHEMICAL EQUILIBRIUM-I

I. Answer the following shortly

- What are reversible and irreversible reactions? (76)
- Chemical equilibrium is dynamic in nature. Why? (78)
- Define law of mass action (80)
- What is equilibrium constant? (82)
- Write the K_c expression for $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ (82)
- Write the K_p expression for $\text{PCl}_5 \rightleftharpoons \text{PCl}_3 + \text{Cl}_2$. (88)
- Relate K_p and K_c when $\Delta n = 0$, $\Delta n = 1$ and $\Delta n = 2$.
- Write the K_c for (i) $\text{CH}_4 + \text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + 3\text{H}_2$ (ii) $2\text{N}_2\text{O}_5 \rightleftharpoons 4\text{NO}_2 + \text{O}_2$

II. Explain elaborately on the following

- Explain the characteristics of a chemical equilibrium. (78)
- Derive an expression for the K_p , K_c for the equilibrium $\text{H}_2 + \text{I}_2 \rightleftharpoons 2\text{HI}$ (85)

- Derive an expression for the K_p , K_c for the dissociation of PCl_5 (87)
- What are the characteristics of equilibrium constant? (91)
- Write note on heterogeneous equilibrium reaction (91)

14. CHEMICAL KINETICS-I

I. Answer the following shortly

- Define half life period.
- Define rate of a reaction (96)
- Name the factors that affect the rate of reaction (98)
- What is a rate determining step. (102)
- Define rate law. Write its unit (99)
- Define order (100)
- What are the differences between rate of reaction and rate constant of reaction? (101)
- What is Second order reaction? Give an example. (104)
- Give an example for Third order reaction. (104)
- Write the unit of zero, first, second and third order reactions.
- What is first order reaction? Give an example
- What is zero order reaction? Give an example

II. Explain elaborately on the following

- Describe the factors on which the rate of reaction depends (98)
- Write the differences between order and molecularity (101)

PROBLEMS

- 1 ml of methyl acetate was added to 20 ml of 0.5N sulphuric acid. 2 ml of the reaction mixture was withdrawn at various time intervals and titrated against a solution of standard alkali. The titre values are tabulated. Show that the reaction is first order and calculate the rate constant and half-life period of the reaction.
- In 1st order reaction, the initial concentration of the reactant is 0.05 mole/litre and the rate constant $1.5 \times 10^{-3} \text{ min}^{-1}$.
- If a reaction with $t_{1/2} = 69.3$ second, has a rate constant value of 10^{-2} per second. Calculate the order of the reaction.
- The half-life period of a first order reaction is 1 hr. What is the time taken for 87.5% completion of the reaction?
- The following results were obtained for the Saponification of ethyl acetate using equal concentrations of ester and alkali:

Time	0	4.89	10.07	23.66	∞
Acid in ml	47.65	38.92	32.62	22.58	11.84

Show that the reaction is of the second order.

- 87.5% of the substance is disintegrated in 45 minutes (first order reaction) what is its half-life?

8. If the half-life of first order reaction is 2 min, how long will take to reach 25% of initial concentration?
9. The half-life for radioactive decay of ^{14}C is 5730 years. An archeological contained wood had only 80% of the ^{14}C found in the living tree. Estimate the age of the sample.

ORGANIC CHEMISTRY

15. BASIC CONCEPTS OF ORGANIC CHEMISTRY

I. Answer the following shortly

1. What is catenation (109)
2. Write IUPAC name of the following compound
i. $\text{CH}_3\text{CH}_2\text{CHO}$ ii. CH_3COCH_3 iii. $\text{CH}_3\text{-O-C}_2\text{H}_5$
3. Define homolytic and heterolytic fission (128)
4. What is substitution reaction? (129)
5. What is addition reaction? (130)
6. What is elimination reaction? (130)
7. What is polymerization reaction? (131) *
8. What is condensation reaction? or What is aldol condensation?(131)
9. Define reduction and oxidation reaction (132)
10. What is clemmensen reduction rection (132)
11. Substantiate with reason NH_3 is a nucleophile and AlCl_3 is a electrophile. (133)
12. Note on carbonium ion and carbanion. (134)
13. Write aldol condensation of reaction. (131)
14. Define free radical. Give an example. (135)
15. What is functional group? Give two example. (113)
16. What are dicarboxylic acid ? give example. (124)
17. Define isomerism. (126)
18. How urea is synthesized?
19. Arrange the bond energy of stability of following C, P, Si, S, O.
20. Write the structure of neo-pentane. Give its IUPAC name.
21. list any three characteristic of organic compound.
22. Write the differences between electrophile and nucleophile. (133)
23. Give any three ionic and neutral nucleophile. (133)
24. What is heterocyclic compound? Give two example. (111)
25. What is alicyclic compound? Give two example. (112)
26. draw the resonance of (a) Formate ion (b) Benzene
27. What is Clemmenson reduction?
28. What is +I effect and –I effect? Give example
29. What are photochemical reactions? Give one examples.
30. What is Lewis acid? Give an example.

31. What is Lewis base? Give an example.

II. Explain elaborately on the following

1. Explain the classification of organic compounds. (109)
2. What are homologous series? Explain their characteristics. (113)
3. Explain the types of isomerism. (126)
4. Distinguish between electrophile and nucleophile. (133)*
5. Explain about inductive effect. (135)
6. Explain about resonance effect. (136)
7. Discuss the various types of structural isomerism with one example each.*
8. Give the structural formula for,
 - (i) butanal
 - (ii) dimethyl acetylene
 - (iii) 1-methoxy propane
 - (iv) 3-pentanone
 - (v) succinic acid*
9. Draw the structure of the following and mention its IUPAC names (a) vinyl chloride (b) allyl chloride (c) iso butyl alcohol (d) tert-butyl alcohol (e) glycerol (d) diethyl ether (e) acetone (f) acetaldehyde
10. Give the IUPAC name of the following compounds

I	$\begin{array}{c} \text{H} \\ \\ \text{H}_3\text{C}-\text{C}-\text{CH}_3 \\ \\ \text{OH} \end{array}$	vi	$\begin{array}{c} \text{H} \\ \\ \text{H}_3\text{C}-\text{C}-\text{CH}_3 \\ \\ \text{I} \end{array}$
ii	$\begin{array}{c} \text{H}_2 \quad \text{H} \quad \text{H}_2 \\ \quad \quad \\ \text{H}_3\text{C}-\text{C}-\text{C}-\text{C}-\text{OH} \\ \\ \text{CH}_3 \end{array}$	vii	$\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{Cl}$
iii	$\begin{array}{c} \text{CH}_3 \\ \\ \text{H}_3\text{C}-\text{C}-\text{OH} \\ \\ \text{CH}_3 \end{array}$	viii	$\begin{array}{c} \text{CH}_3 \\ \\ \text{Cl}-\text{C}-\text{CH}-\text{CH}_3 \\ \\ \text{H}_2 \end{array}$
iv	$\begin{array}{c} \text{CH}_3 \\ \\ \text{H}_3\text{C}-\text{C}-\text{C}-\text{CH}_3 \\ \quad \\ \text{OH} \quad \text{H}_2 \end{array}$	ix	$\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{Cl}$
v	$\begin{array}{c} \text{Br} \\ \\ \text{H}_3\text{C}-\text{CH}-\text{C}-\text{C}-\text{CH}_3 \\ \quad \\ \text{H}_2 \quad \text{H}_2 \end{array}$	X	$\text{CH}_3-\text{CH}_2-\text{Br}$

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11. Write the IUPAC name of the following compounds

i	$\text{CH}_3\text{—CH}_2\text{—NH}_2$	vi	$\text{CH}_3\text{—CH}_2\text{—CH}_2\text{—COOH}$
ii	$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3\text{—CH}_2\text{—N—CH}_3 \end{array}$	vii	$\begin{array}{c} \text{H} \quad \text{H}_2 \\ \quad \\ \text{H}_3\text{C—C—C—COOH} \\ \\ \text{CH}_3 \end{array}$
iii	$\begin{array}{c} \text{CH}_3\text{—CH}_2\text{—C—CH}_3 \\ \\ \text{O} \end{array}$	viii	$\text{CH}_3\text{—CH}_2\text{—O—CH}_2\text{—CH}_3$
iv	$\begin{array}{c} \text{CH}_3\text{—CH}_2\text{—C—C—CH}_3 \\ \quad \\ \text{O} \quad \text{H}_2 \end{array}$	ix	$\begin{array}{c} \text{H}_2 \quad \text{H}_2 \\ \quad \\ \text{H}_3\text{C—O—CH}_2\text{—C—CH}_3 \end{array}$
v	$\text{CH}_3\text{—CH}_2\text{—CHO}$	x	$\begin{array}{c} \text{CH}_3\text{—O—CH—CH}_3 \\ \\ \text{CH}_3 \end{array}$

11. Write the structure of the following compounds

- Formaldehyde
- Acetaldehyde
- Acetic acid
- Ethyl alcohol
- Isopropyl alcohol
- Sec-butyl alcohol
- Tert-butyl alcohol

12. Write the IUPAC name of the following compounds

i	$\text{CH}_3\text{—NH—CH}_3$
ii	$\text{CH}_3\text{—CH}_2\text{—NH—CH}_2\text{—CH}_3$

iii	
iv	CH ₃ -NO ₂
v	CH ₃ -CH ₂ -NO ₂
vi	

13. Give the structural formula and IUPAC for (i) malonic acid (ii) succinic acid (iii) dimethyl amine (iv) isopropyl amine

16. PURIFICATION OF ORGANIC COMPOUNDS

I. Answer the following shortly

1. What are various methods used for purification and separation of organic compounds? (140)
2. What is sublimation? (142) *
3. What are different types of distillation? (143)
4. What are the advantages of distillation under reduced pressure? (145)
5. What is chromatography? (146)
6. What are the difference between paper and thin layer chromatography? (149)
7. What is retention factor? (148) *
8. What is R_f value? (148)
9. What is crystallization? (141)
10. Write the stationary and mobile phase of PC, TLC.

II. Explain elaborately on the following

1. Explain the general characteristics of organic compounds (140)
2. Explain the purification of compounds by sublimation (142)
3. Explain the simple distillation methods (143)
4. Explain about column chromatography (147)
5. Explain about paper chromatography (148)

17. DETECTION AND ESTIMATION OF ELEMENTS

I. Answer the following shortly

1. How do you detect the presence of carbon and hydrogen in an organic compound?
2. How do you detect the presence of nitrogen in an organic compound?
3. How do you detect the presence of sulphur in an organic compound?
4. How do you detect the presence of halogens in an organic compound?
5. Write chemical equation involved in Lassaigne test for nitrogen.

6. Write chemical equations involved in the detection of sulphur in the presence of nitrogen in an organic compound.
7. Write chemical equation involved in the direction of sulphur in the organic compound.
8. How Lassaigne extract is prepared?

17. DETECTION & ESTIMATION OF ELEMENTS

ESTIMATION OF CARBON AND HYDROGEN

1. 0.12 g of an organic compound gave on combustion 0.18 g of water and 0.11 g of CO_2 . Calculate the percentage of C and H in the organic compound.
2. An organic compound contains C, H and O. 0.2475 g of the organic compound yielded on combustion 0.4950 g of CO_2 and 0.2025 g of H_2O . Find the percentage composition of the organic compound.
3. 0.2004 g of glucose gave on combustion 0.2940 g of CO_2 and 0.1202 g of H_2O . Find the percentage composition.
4. 0.2056 g of an organic compound gave on combustion 0.114 g of H_2O and 0.880 g of CO_2 . Find the percentage of hydrogen and carbon in the organic compound.

ESTIMATION OF NITROGEN

5. 1.15 g of an organic compound was analyzed by Kjeldahl's method and the ammonia produced was collected in 30 ml of normal HCl solution. The excess of acid consumed 18.4 ml of normal sodium hydroxide solution for back titration. Calculate the percentage of nitrogen in the substances.
6. 0.80 g of substance was digested with sulphuric acid and then distilled with an excess of caustic soda. The ammonia gas evolved was passed through 100ml of 1N H_2SO_4 . The excess of the acid required 80 ml of 1N caustic soda solution for its complete neutralisation. Calculate the percentage of nitrogen in the organic compound.
7. 0.36 g of a nitrogenous organic compound was Kjeldahlised and the ammonia liberated was exactly neutralized by 20 ml of 0.3 N H_2SO_4 . Calculate the percentage of nitrogen in the compound.
8. 0.257 g of an organic substance was Kjeldahlised and ammonia evolved was absorbed in 50 ml of N/10 HCl which required 23.2 ml of N/10 NaOH for neutralisation. Determine the percentage of nitrogen in the compound.
9. During nitrogen estimation present in an organic compound by Kjeldahl's method, the ammonia evolved from 0.5 g of the compound in Kjeldahl's estimation of nitrogen neutralized 10 ml of 1M H_2SO_4 . Find the percentage of nitrogen in the compound.

ESTIMATION OF SULPHUR

10. 0.4037 g of an organic substance containing sulphur was heated with concentrated nitric acid in a Carius tube. On precipitation with BaCl_2 , 0.1963 g of BaSO_4 was produced. Determine the percentage of sulphur in the compound.
11. 0.316 g of an organic compound gives 0.466 g of barium sulphate by Carius method. Calculate the percentage of sulphur.
12. 0.530 g of an organic compound gave 0.90 g of BaSO_4 in Carius determination of sulphur. Calculate the percentage of sulphur.

ESTIMATION OF HALOGENS

13. 0.24 g of an organic compound gave 0.287 g of AgCl in the Carius method. Calculate the percentage of chlorine in the compound.
14. In Carius method of estimation of halogen 0.15 g of an organic compound, gave 0.12 g of AgBr . Find the percentage of bromine in the compound.
15. 0.301 g of an organic compound gave 0.232 g of silver bromide by Carius method. Find the percentage of bromine.
16. 0.196 g of an organic compound gave 0.22 g of CO_2 and 0.0675 g of H_2O . In Carius determination, 0.3925 g of the substance gave 0.717 g of dry AgCl . Find the percentage composition of the substance.
17. 0.25 g of an organic compound was found to produce 0.35 g of AgCl after heating with fuming HNO_3 and AgNO_3 in a sealed Carius method. Determine the percentage of chlorine in the compound.

II. Explain briefly on the following

1. How do you detect the presence of carbon and hydrogen in an organic compound? (151)
2. Explain the estimation of nitrogen by Kjeldahl's method (157)
3. Explain the estimation of sulphur by Carius method (160)
4. Explain the estimation of halogen by Carius method (161)

18. HYDROCARBONS

I. Answer the following shortly

1. What is wurtz reaction? (170)
2. Write Kolbe's electrolytic method (171)
3. What is Finkelstein's reaction (173)
4. Define aromatization (174)
5. Define Markovnikov's rule (179)
6. What is hydroboration? (180)
7. What is epoxidation? (181)
8. Write Diels Alder reaction (181)
9. Mention the uses of alkene (181)
10. What are test for acetylene (188)

11. What happens when acetylene is passed through red hot tube? (188)
12. What is ozonolysis? (180)
13. What is polymerization? (181)
14. What is isomerisation? (173)
15. What is cracking ?169
16. Write the sources of alkanes. 169
17. What is Raney Nickel? Mention its uses.
18. How will you convert Grignard reagent of alkane?
19. Write on decarboxylation carboxylic acid. 170
20. Compare the boiling point of linear and branched chain alkanes. 171
21. Compare the melting point of linear and branched chain alkanes. 171
22. Account: acidic nature of alkyne. 187
23. Find the E & Z isomers of the following

23. Find the cis & trans isomers of the following

24. Explain the stability of carbocation.
25. Write about ozonolysis of acetylene.
26. How do acetylene converted into (a) acetone (b) acetaldehyde
27. Write any two methods of preparation alkynes.
28. Convert acetylene to ethane.

19. AROMATIC HYDROCARBONS

I. Answer the following shortly

1. Define aromaticity (193)
2. How is benzene is prepared commercially (192)
3. What is Friedel craft's alkylation reaction? (197)
4. Mention the uses of benzene (199).
5. What is wurtz fittig reaction? (213)
6. What are o, p-directing group? Why it is also known as activating group? Give examples.
7. What are m-directing group? Why it is also known as deactivating group? Give examples.
8. Compare reactivity of benzene, o, p-directing group and m-directing group present on benzene. Justify.
9. Draw the resonance structure of phenol. At what position electron density in increased. Why?
10. Draw the resonance structure of nitrobenzene. At what position electron density in increased. Why?
11. Write on sulphonation and chlorination of benzene.
12. Discuss on polynuclear aromation compound and mention its characteristics.
13. Convert benzene diazonium salts into chloro benzene.

II. Explain briefly on the following

1. How would you convert the following (195)
 - i. Sodiumbenzoate to benzene
 - ii. Phenol to benzene
 - iii. Benzene to toluene
2. Write briefly resonance in benzene (201)
3. Explain about the structure of benzene (198)

20. ORGANIC HALOGEN COMPOUNDS

I. Answer the following shortly

1. What is Hunsdiecker reaction? (206)
2. What is Finkelstein reaction? (206)
3. What is swartz reaction? (207)
4. What is wurtz fitting reaction (213)
5. What is fittig reaction? (213)
6. How is DDT prepared? Mention its uses (214)
7. Write the reduction of aralkyl halides (215)
8. What is Grignard reagent? (215)
9. Compare the boiling point of CH_3Cl , CH_3F , CH_3I , CH_3Br .

10. boiling point of alkyl halide increases with increasing length of alkyl group why?
11. convert chlorobenzene to (a) benzene (b) phenyl magnesium chloride
12. List the uses of aryl halides. 214

II. Explain briefly on the following

1. What are the general methods of preparation of alkyl halides (206)
2. Discuss SN_1 reaction mechanism (209)
3. Discuss SN_2 reaction mechanism (208)
4. Discuss E_1 mechanism (210)
5. Discuss E_2 mechanism (210)
6. Explain synthetic uses of methyl magnesium iodide (216)
7. Convert methyl magnesium chloride into

1. Methane
2. Ethane
3. Ethanol
4. Isopropyl alcohol
5. Tertiary butyl alcohol
6. Acetone
7. Ethyl acetate
8. Acetic acid
9. Ethyl methyl ether
10. Methyl cyanide

வெற்றிக்கும் தோல்விக்கும்
சிறு வித்தியாசம்தான்.
கடமையை செய்தால் வெற்றி,
கடமைக்கு செய்தால் தோல்வி!

-தமிழ் பொன்மொழிகள் -