

- (d) Modern Periodic Law and advantages of Modern Periodic Table. [Q.N. 33(a), 2065]  
 (e) Periodic properties of elements. [Q.N. 33(ii), 2066]  
 (f) Electron affinity and ionisation potential. [Q.N. 33 (i), 2067]  
 (g) Advantage of Modern Periodic Table. [Q.N.33(c), Set 'B' 2069]  
 (h) Merits and demerits of Modern periodic table. [Q.N. 33(b), Supp. 2069]  
 (i) Periodic properties of elements. [Q.N.33(a), 2070 'C']  
 (j) Disadvantage of Mendeleev's periodic table [Q.N.33(d), 2070 'D']

## Unit 8 – Oxidation and Reduction

### Very Short Questions

(All questions are of equal value, 2 marks each.)

- What is the oxidation number of Chromium in Potassium chromate ? [Group A, Q.N.4, 2051]
- Give the oxidation number of sulphur and chromium in  $\text{SO}_4^{2-}$  and  $\text{Na}_2\text{Cr}_2\text{O}_7$  respectively. [Group A, Q.N.12, 2052]
- What is the oxidation number of oxygen in  $\text{H}_2\text{O}_2$  and Phosphorus in  $\text{PO}_4^{3-}$ ? [Group A, Q.N.13, 2053]
- Assign oxidation numbers to the underlined elements in each of the following formula.  
 $\text{MnO}_4^-$ ,  $\text{TiCl}_4$ ,  $\text{NH}_3$  [Q.N.3, 2054]
- Define oxidation number of an element in a compound. Calculate the oxidation number of P in  $\text{H}_3\text{PO}_4$ . [Q.N.8, 2056]
- Calculate the oxidation number of S in  $\text{K}_2\text{S}_2\text{O}_3$  and  $\text{SO}_2\text{Cl}_2$ . [Q.N.10, 2057]
- How is the following ionic equation a redox reaction ?  
 $\text{Cl}_2 + 2\text{OH}^- \rightarrow \text{Cl}^- + \text{ClO}^- + \text{H}_2\text{O}$  [Q.N.9, 2060]
- Calculate the oxidation number of S in  $\text{Na}_2\text{S}_2\text{O}_3$  and  $\text{H}_2\text{S}_2\text{O}_7$ . [Q.N.8, 2061]
- Calculate the oxidation number of underlined atoms in the following:  
 (a)  $\text{NH}_4\text{NO}_3$  (b)  $\text{MnO}_4^{2-}$  [Q.N.10, 2062]
- Balance the following chemical equation by oxidation number change method or ion electron method.  
 $\text{Cu} + \text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{NO}_2 + \text{H}_2\text{O}$  [Q.N. 7, 2063]
- Calculate the oxidation number of:  
 (a) Carbon in  $\text{H}_2\text{C}_2\text{O}_4$   
 (b) Phosphorous in  $\text{H}_2\text{PO}_4^-$  [Q.N. 8, 2064]
- How would you show the following reaction is a redox reaction ?  
 $\text{Mg} + \text{Cl}_2 \rightarrow \text{MgCl}_2$  [Q.N.11, 2068]
- Calculate the oxidation number of Sulphur atom in  $\text{H}_2\text{S}_2\text{O}_3$  and  $\text{H}_2\text{S}$ . [Q.N. 11, Supp. 2068]
- Calculate the oxidation number of:  
 i) C in  $\text{C}_2\text{H}_2\text{O}_4$  ii) Mn in  $\text{MnO}_4^-$  [Q.N. 11, Set 'A' 2069]
- Calculate the oxidation number of carbon in:  
 i)  $\text{C}_2\text{H}_2\text{O}_4$  ii)  $\text{CO}_3^{2-}$  [Q.N. 11, Set 'B' 2069]
- Calculate the oxidation number of:  
 a. carbon in  $\text{H}_2\text{C}_2\text{O}_4$   
 b. phosphorous in  $\text{H}_3\text{PO}_4$ . [Q.N. 10, 2070 'C']
- Find the Oxidation number of nitrogen in  
 a) Ammonia b) Ammonium Sulphate 1+1 [Q.N. 11, 2070 'D']

## Short Questions

(All questions are of equal value, 5 marks each.)

- Specifying oxidation half, reduction half, oxidizing agent and reducing agent. Balance the equation by ion electron or O.N. method:  

$$\text{Fe}^{2+} + \text{H}^+ + \text{NO}_3^- \rightarrow \text{Fe}^{3+} + \text{NO} + \text{H}_2\text{O} \quad [\text{Q.N.24, 2056}]$$
- Define oxidation and reduction in terms of electronic concept. Balance the following reaction by ion electron or oxidation number method  

$$\text{Cu} + \text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{NO} + \text{H}_2\text{O} \quad [\text{Q.N.24, 2057}]$$
- Define redox reaction. Balance the following equation by oxidation number or ion-electron method. Also point out the oxidant and reductant:  

$$\text{I}_2 + \text{HNO}_3 \rightarrow \text{HIO}_3 + \text{NO}_2 + \text{H}_2\text{O} \quad [\text{Q.N. 24, 2064}]$$
- What is oxidation number ? Balance the following equation by oxidation number or ion-electron method :  

$$\text{KI} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + \text{I}_2 + \text{H}_2\text{S} + \text{H}_2\text{O} \quad [\text{Q.N. 25, 2065}]$$
- Define oxidation and reduction (electronic interpretation). [Q.N.28 (a), 2055]
  - Balance the following equations, identifying in each case the oxidizing and the reducing agent:
    - $\text{H}_2\text{S} + \text{H}_2\text{O}_2 \rightarrow \text{S} + \text{H}_2\text{O}$
    - $\text{C} + \text{HNO}_3 \rightarrow \text{NO}_2 + \text{H}_2\text{O} + \text{CO}_2$
    - $\text{MnO}_4^- + \text{S}^{2-} + \text{H}_2\text{O} \rightarrow \text{MnO}_2 + \text{S} + \text{OH}^- \quad [\text{Q.N.28 (b), 2055}]$
- Point out the oxidant and reductant in the following redox reaction and balance the reaction by oxidation number or ion electron method.  

$$\text{NaOH} + \text{Br}_2 \longrightarrow \text{NaBrO}_3 + \text{NaBr} + \text{H}_2\text{O}. \quad [\text{Q.N.25, 2062}]$$
- Prove that 'Oxidation and Reduction is simultaneous process'. Balance the following equation by oxidation number method or ion-electron method.  

$$\text{MnO}_2 + \text{HCl} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + \text{H}_2\text{O} \quad [\text{Q.N.25, 2066}]$$
- Balance the following redox reaction by oxidation number of ion-electron method and point out the oxidant and reductant.  

$$\text{K}_2\text{Cr}_2\text{O}_7 + \text{SnCl}_2 + \text{HCl} \rightarrow \text{CrCl}_3 + \text{SnCl}_4 + \text{KCl} + \text{H}_2\text{O} \quad [\text{Q.N. 24, 2067}]$$
- What is meant by redox reaction? Balance the following equation by oxidation number or ion-electron method:  

$$\text{KMnO}_4 + \text{C}_2\text{H}_2\text{O}_4 + \text{H}_2\text{SO}_4 \longrightarrow \text{K}_2\text{SO}_4 + \text{MnSO}_4 + \text{CO}_2 + \text{H}_2\text{O} \quad 1+4 [\text{Q.N. 23, Set 'A' 2069}]$$
- What is meant by oxidation number? Balance the following equation by oxidation number or ion-electron method:  

$$\text{MnO}_4^- + \text{C}_2\text{H}_2\text{O}_4 + \text{H}^+ \rightarrow \text{Mn}^{++} + \text{H}_2\text{O} + \text{CO}_2 \quad 1+4 [\text{Q.N. 25, Set 'B' 2069}]$$
- How would you define Oxidant and Reductant in term of electronic concept? Balance the following equation by oxidation number or ion-electron method.  

$$\text{MnO}_4^- + \text{C}_2\text{H}_5\text{OH} + \text{H}^+ \rightarrow \text{Mn}^{++} + \text{CH}_3\text{COOH} + \text{H}_2\text{O} \quad [\text{Q.N. 24, Supp. 2069}]$$
- What is oxidation number? Balance the following equation by oxidation number or ion-electron method.  

$$\text{Cu} + \text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{NO} + \text{H}_2\text{O} \quad 1+4 [\text{Q.N. 24, 2070 'C'}]$$
- What is meant by oxidation number? Balance the following equation by oxidation number or ion-electron method indicating oxidant and reductant.  

$$\text{NaOH} + \text{S} \rightarrow \text{Na}_2\text{S} + \text{Na}_2\text{S}_2\text{O}_3 + \text{H}_2\text{O}. \quad [\text{Q.N. 24, 2070 'D'}]$$



## Long Questions

(All questions are of equal value, 10 marks each.)

- Define oxidation and reduction. [Group C, Q.N. 2 (a), 2051]
- Balance the following oxidation-reduction equations (You may use either ion-electron method or oxidation number method)
  - $\text{HNO}_3 + \text{H}_2\text{S} \rightarrow \text{NO} + \text{S} + \text{H}_2\text{O}$
  - $\text{KMnO}_4 + \text{KCl} + \text{H}_2\text{SO}_4 \rightarrow \text{MnSO}_4 + \text{K}_2\text{SO}_4 + \text{H}_2\text{O} + \text{Cl}_2$  [Group C, Q.N.2 (b), 2051]
- Define oxidation reduction in terms of loss and gain of electrons. Illustrate your answer with balanced symbol equation.  
 $\text{S} + \text{HNO}_3 \rightarrow \text{SO}_2 + \text{NO}_2 + \text{H}_2\text{O}$   
 In the above reactants which one is oxidized and which one is reduced? [Group C, Q.N.2, 2052]
- What do you mean by redox-reaction? [Group C, Q.No. 3(a), 2053]
- Balance the following redox-reaction by oxidation number method  
 $\text{KMnO}_4 + \text{KCl} + \text{H}_2\text{SO}_4 \rightarrow \text{MnSO}_4 + \text{K}_2\text{SO}_4 + \text{H}_2\text{O} + \text{Cl}_2$  [Group C, Q.N.3 (b), 2053]
- With a suitable example explain the terms:
  - Oxidizing agent
  - Reducing agent
  - Oxidation
  - Reduction and Balance the following reactions by oxidation number method.
    - $\text{Cr}_2\text{O}_7^{2-} + \text{Fe}^{2+} + \text{H}^+ \rightarrow \text{Cr}^{3+} + \text{Fe}^{3+} + \text{H}_2\text{O}$
    - $\text{Zn} + \text{HNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{N}_2\text{O} + \text{H}_2\text{O}$  [Q.N.29, 2054]
- Define oxidation and reduction in terms of electronic concept. [Q.N.31 (a), 2059]
- You are given the equation  $\text{Zn} + \text{HNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{N}_2\text{O} + \text{H}_2\text{O}$ 
  - Explain with electronic concept which substance is oxidized and which is reduced?
  - Balance the equation by ion electron or oxidation number method.
  - Indicate the number of  $\text{HNO}_3$  molecules acting as an oxidizing agent and as an acidic agent. [Q.N.31 (b), 2059]
- Write short note :
  - Oxidation and reduction in term of electronic concept and oxidation number. [Q.N.33(iv), 2068]
  - Redox reaction. [Q.N.33(d), Supp. 2068]

## Numerical Problems

- How many mol of  $\text{Fe}^{2+}$  can be oxidized to  $\text{Fe}^{3+}$  by 0.75 mol of  $\text{Cl}_2$ , according to the following equation?  
 $\text{Fe}^{2+} + \text{Cl}_2 \rightarrow \text{Fe}^{3+} + \text{Cl}^-$   
 [Ans: 1.5 mol of  $\text{Fe}^{2+}$ ] [Q.N.5, 2058]
- Calculate the oxidation number of:
  - S in  $\text{Na}_2\text{S}_2\text{O}_7$   
 Ans: +6
  - N in  $\text{NH}_4\text{Cl}$ .  
 Ans: -3 [Q.N. 10, Supp. 2069]
- An atom 'A' has atomic number ( $Z = 29$ ). Calculate the total number of s-electrons of  $\text{A}^{++}$ .  
 [Ans: 8] [Q.N. 6, 2070 'C']

## Unit 9 – Equilibria

## Very Short Questions

(All questions are of equal value, 2 marks each.)

- Predict the effect of temperature on the equilibrium of the reaction:  

$$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g}), H = -93.6 \text{ kJ}$$
 [Q.N.11, 2056]
- How does temperature change affect the equilibrium of the given reaction?  

$$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g}), \Delta H = -22.4 \text{ Kcal/mol.}$$
 [Q.N.9, 2059]
- Write down the relation between  $K_p$  and  $K_c$ . What is condition for a gaseous reaction to have  $K_p = K_c$ ? [Q.N.11, 2060]
- Why does pressure have no effect on  $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$ ? Write  $K_c$  for the reaction. [Q.N.8, 2062]
- How do increase in temperature and pressure affect the equilibrium of the following reaction. [Q.N. 6. 2063]
- $$2\text{SO}_2(\text{g}) + \text{O}_2 \rightleftharpoons 2\text{SO}_3(\text{g}) + \text{heat}$$
 Why is the formation of  $\text{SO}_3$  favoured by increasing pressure and decreasing temperature on the following system?
- $$2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g}) + \text{heat}$$
 Define equilibrium constant. Write the expression of equilibrium constant ( $K_c$ ) for the following reaction: [Q.N. 10, 2064]
- $$\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$$
 [Q.N. 12, 2065]
- What happens when pressure is increased in the following equilibrium reactions?  

$$\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$$

$$\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$$
 [Q.N.12, 2066]
- What is meant by the term active mass? Express the active mass of the reactants in the following reaction  $2\text{P} + \text{Q} \rightarrow \text{products}$ . [Q.N. 12, 2067]
- What happens when the pressure is increased in the following equilibrium reaction:  
 (i)  $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{NO}(\text{g})$   
 (ii)  $\text{N}_2(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \text{NH}_3(\text{g})$  [Q.N.12, 2068]
- State Lechateliers' principle. [Q.N. 12, Supp. 2068]
- What is the effect of increasing pressure and decreasing temperature on the following equilibrium:  

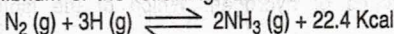
$$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g}) + \text{heat}$$
 [Q.N. 12, Set 'A' 2069]
- Define law of mass action. What is the relation between  $K_p$  and  $K_c$  for the following reaction?  

$$\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$$
 [Q.N. 12, Set 'B' 2069]
- What is the effect of increase in temperature of the following reactions. [Q.N. 12, Supp. 2069]
- a. 
$$\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + \text{heat} \rightleftharpoons 2\text{NO}(\text{g})$$
  
 b. 
$$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g}) + \text{heat}$$
- Mention proper conditions for maximum yield of  $\text{SO}_3$  in the following equilibrium reaction. [Q.N. 7, 2070 'C']
- $$2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g}) + \text{heat}$$
- What is meant by equilibrium constant ( $K_c$ ). Write a chemical equilibrium in which  $K_c$  become equal to  $K_p$ . 1+1 [Q.N. 12, 2070 'D']



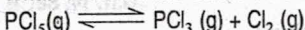
**Short Questions***(All questions are of equal value, 5 marks each.)*

1. State Le-chatlier's principle. How does the change in temperature and pressure affect the equilibrium of the following reaction -



[Q.N.25, 2057]

2. What would be the effect on the position of equilibrium of the reaction?



On (a) adding  $\text{Cl}_2$  (b) adding  $\text{PCl}_3$  (c) decreasing the pressure by increasing the volume of the system (d) increasing temperature (the reaction is endothermic in the forward reaction) (e) adding a catalyst.

[Q.N.24, 2058]

**Long Questions***(All questions are of equal value, 10 marks each.)*

1. Write short notes on:

- (a) Law of mass action [Q.N.33 (a), 2059]
- (b) Le Chatelier's Principle [Q.N.33 (d), 2061]
- (c) Law of mass action [Q.N.33 (iv), 2062]
- (d) Law of mass action [Q.N. 33(a) 2063]
- (e) Le Chatelier's Principle. [Q.N. 33(d), 2064]
- (f) Relation between  $K_p$  and  $K_c$ . [Q.N. 33(d), 2065]
- (g) Law of mass action. [Q.N. 33(i), 2066]
- (h) Le-Chatelier's Principle. [Q.N. 33 (ii), 2067]
- (i) Relation between  $K_c$  and  $K_p$ . [Q.N.33(ii),2068]
- (j) Relation between  $K_p$  and  $K_c$  [Q.N.33(c), Supp. 2068]
- (k) Relation between  $K_p$  and  $K_c$ . [Q.N.33(a), Set 'A' 2069]
- (l) Application of Le-Chatelier Principle in Physical and chemical equilibria. [Q.N.33(d), Set 'B' 2069]
- (m) Law of mass action [Q.N. 33(a), Supp. 2069]
- (n) Relation between  $K_p$  and  $K_c$ . [Q.N.33(c), 2070 'C']
- (o) Relation between  $K_p$  and  $K_c$ . [Q.N.33(c), 2070 'D']

**Section B: Inorganic Chemistry****Unit 10 - Non-metals (I)****10.1 Hydrogen****Very Short Questions***(All questions are of equal value, 2 marks each.)*

- Give a reaction which shows that water contains hydrogen. [Q.N.7, 2054]
- When steam is passed through red hot coke, a mixture of two gases is obtained. Name the gases and write the reaction involved. [Q.N.8, 2054]
- What happens when:
  - Zinc dust is added to an acidified solution of potassium permanganate. [Q.N.27 (c), 2054]
- Differentiate between ortho and para hydrogen. [Q.N.13, 2059]
- Mention an important use of each of the following :
  - Hydrogen gas [Q.N.14 (iii), 2066]
  - Deuterium [Q.N.14 (iv), 2066]
  - Most abundant isotope of hydrogen [Q.N. 14 (ii), 2067]
- Mention one important use of each of the followings:
  - Heavy water
  - Tritium
  - Nascent hydrogen
  - Deuterium

[Q.N.13,2068]

- What are the differences between nascent and molecular hydrogen? [Q.N. 13, Supp. 2068]
- What is meant by nascent hydrogen? Give a chemical reaction to support that nascent hydrogen is a powerful reducing agent. 1+1 [Q.N. 14, Supp. 2069]
- Name the isotopes of hydrogen. Which of the isotope of hydrogen is radioactive? [Q.N. 13, Set 'A' 2069]
- Give a reaction to show nascent hydrogen is more powerful reducing agent than molecular hydrogen. [Q.N. 14, Set 'B' 2069]

### Short Questions

(All questions are of equal value, 5 marks each.)

- Show that nascent hydrogen is powerful reducing agent than molecular hydrogen. [Group A, Q.N.21, 2052]
- List all the possible isotopes of hydrogen. Name the isotope which does not contain neutron. [Group A, Q.N.23, 2052]

### Long Questions

(All questions are of equal value, 10 marks each.)

- Write short notes on:  
a) Isotopes of hydrogen [Group C, Q.N.4 (a), 2051]

## 10.2 Oxygen

### Very Short Questions

(All questions are of equal value, 2 marks each.)

- Choose oxide from the following that you would expect to be acidic. Give a reaction to justify. Your choice  $\text{Na}_2\text{O}$ ,  $\text{ZnO}$ ,  $\text{MgO}$ ,  $\text{SO}_3$ . [Group A, Q.N.24, 2053]
- Write the names of any two neutral oxides with their formulae. [Q.N.13, 2057]
- What are Neutral and Amphoteric Oxides? Give one example of each. [Q.N.16, 2058]
- What are oxides? Give an example of an amphoteric oxide. [Q.N. 12, 2063]
- Classify the following oxides with reason :  
 $\text{Al}_2\text{O}_3$ ,  $\text{CO}_2$  [Q.N. 15, 2065]
- Mention an important use of each of the following :  
(a) Ozone Layer [Q.N.14 (ii), 2066]  
(b) allotrop of oxygen [Q.N. 14 (i), 2067]  
(c) amphoteric oxide [Q.N. 14 (iii), 2067]  
(d) neutral oxide [Q.N. 14 (iv), 2067]  
(e) Heavy water [Q.N. 13(a), Supp. 2069]  
(f) Ozone-layer [Q.N. 13(b), Supp. 2069]
- Name any two oxides each of the following:  
(i) amphoteric (ii) neutral [Q.N. 14, Supp. 2068]
- Name the allotrops of oxygen. Give an important use of each. [Q.N. 14, Set 'A' 2069]
- Mention one example of each of the following:  
a. Peroxide [Q.N. 12, 2070 'C']  
b. Neutral oxide
- Classify the following oxides.  $4 \times 0.5$  [Q.N. 13, 2070 'D']  
 $\text{N}_2\text{O}_3$ ,  $\text{NO}$ ,  $\text{BaO}_2$  and  $\text{Fe}_2\text{O}_3$ .

### Short Questions

(All questions are of equal value, 5 marks each.)

- What are oxides? Classify the following oxides justifying the classification :  
(a)  $\text{NO}$  (b)  $\text{CO}_2$  (c)  $\text{ZnO}$  (d)  $\text{CaO}$

[Q.N.26, 2061]



## Long Questions

*(All questions are of equal value, 10 marks each.)***(No any questions have been asked in this section upto now.)****10.3 Ozone**

## Very Short Questions

*(All questions are of equal value, 2 marks each.)*

- Write the resonating structure of ozone. [Q.N. 14, 2064]
- How is oxygen converted into ozone? Give one important use of ozone. [Q.N. 13, Set 'B' 2069]
- Mention an important use of each of the following :  
a. Ozone-layer [Q.N. 13(b), Supp. 2069]
- How is Ozone formed in the stratosphere? [Q.N. 19, 2070 'C']
- How is oxygen converted into ozone? Mention major one use of ozone. [Q.N. 14, 2070 'D']

**10.4 Water**

## Very Short Questions

*(All questions are of equal value, 2 marks each.)*

- Name different amorphous forms of sulphur. [Group A, Q.N.10, 2051]
- Why water is an excellent solvent for a polar substance? [Q.N.12, 2054]
- Why does water have such a relatively high boiling point? [Q.N.11, 2058]
- Why water is an excellent solvent for a polar substance ? [Q.N.4, 2061]
- Mention an important use of each of the following :  
(a) Heavy water [Q.N.14 (i), 2066]
- Mention an important use of each the followings.  
a. Heavy water [Q.N. 13(a), Supp. 2069]

## Short Questions

*(All questions are of equal value, 5 marks each.)***(No any questions have been asked in this section upto now.)****10.5 Nitrogen and Its Compounds**

## Very Short Questions

*(All questions are of equal value, 2 marks each.)*

- Write the names of any two metals which can liberate Hydrogen gas from Nitric Acid. [Group A, Q.N.9, 2051]
- What happens when:  
(a) Gas obtained by heating slaked lime and ammonium chloride is passed through copper sulphate solution. [Group B, Q.N.7 (b), 2051]  
(b) Dilute nitric acid reacts with magnesium [Group B, Q.N.7 (c), 2052]  
(c) A mixture of ammonia and oxygen is passed over platinum gauze heated to 800°C. [Group B, Q.N.7 (d), 2052]  
(d) A solution of sodium nitrate and ammonium chloride is heated to boiling. [Group B, Q.N.7 (b), 2053]  
(e) Zinc is added in a hot alkaline solution of potassium nitrate. [Q.N.32 (i), 2059]  
(f) Mercurous nitrate paper is exposed in ammonia gas. [Q.N.32 (ii), 2059]  
(g) Mercurous nitrate paper is placed over a jar containing ammonia gas. [Q.N.27 (ii), 2060]
- How does an ammonia molecule differ from ammonia ion? [Group A, Q.N.15, 2053]
- Write equations for the reactions between:  
a) ammonia and copper (II) oxide. b) ammonia and chlorine [Q.N.15, 2055]

5. Write the action of aquaregia on gold. [Q.N.17, 2059]
6. Explain why ammonia gas cannot be dried by passing through conc.  $H_2SO_4$  acid. [Q.N.15, 2061]
7. In the ring test of nitrate what chemical compound is formed ? [Q.N.17, 2061]
8. What happens when freshly prepared ferrous sulphate is added to the mixture of conc. nitric acid and conc. sulphuric acid ? [Q.N.14, 2062]
9. What happens when:
  - i) Carbon monoxide is heated with hydrogen in presence of ZnO and Cu ? [Q.N.15(i), 2068]
  - (ii) Phosphorus reacts with vary dil. nitric acid. [Q.N. 27 (iv), Supp. 2068]

### Short Questions

*(All questions are of equal value, 5 marks each.)*

1. Describe the principle involved in the manufacture of ammonia gas by Haber's process. [Q.N.26, 2054]
2. Write down the manufacture of  $HNO_3$  by catalytic oxidation of ammonia. [Q.N.26, 2057]
3. Discuss the principle and draw a self explanatory sketch for the manufacture of ammonia by Haber's synthesis. [Q.N.26, 2060]
4. Describe the principle involved in the manufacture of ammonia by Haber's process. What happens when ammonia gas is passed through heated CuO ? [Q.N.27, 2062]
5. The gas obtained by heating ammonium chloride with quick lime is passed through copper sulphate solution ? [Q.N. 27,(ii) 2063]
6. What are the necessary physical conditions and chemical principle involved in the manufacture of ammonia gas by Haber's process ? Why is ammonia highly soluble in water ? [Q.N. 27, 2067]
7. What happen when:
  - (i) Conc. nitric acid exposed to light [Q.N. 27 (V), supp. 2068]
8. Sketch a well-labelled diagram for the manufacture of ammonia by Haber's process. Write physical and chemical principles involved in it. Why can't  $NH_3$  be dried by passing over conc.  $H_2SO_4$ ? [Q.N. 29, Set 'B' 2069]
9. Write balanced chemical reaction for the preparation of ammonia by Haber's process. How does ammonia react with
  - a) sodium    b) chlorine    c)  $CuSO_4$  solution [Q.N. 27, 2070 'D']

### Long Questions

*(All questions are of equal value, 10 marks each.)*

1. Describe the manufacture of nitric acid by Ostwald's process giving a neat and labelled diagram. How is nitric acid detected in the laboratory? [Q.N.30, 2056]
2. Describe the manufacture of nitric acid by oxidation of ammonia. Give the action of very dilute and dilute nitric acid on the magnesium metal. [Q.N.30, 2061]
3. Describe the manufacture of nitric acid by catalytic oxidation of ammonia. Write a chemical reaction to show nitric acid contains nitrogen. [Q.N. 31, 2064]
4. Describe the principle and draw a self explanatory sketch for the manufacture of ammonia by Haber's synthesis. How does ammonia react with :
  - (i) Carbon dioxide
  - (ii) Copper Sulphate solution
  - (iii) Sodium metal
  - (iv) Chlorine gas in excess [Q.N. 31, 2065]
5. Write down the principle and sketch a labelled diagram for the manufacture of nitric acid by the oxidation of ammonia. What happens when :
  - (i) Conc. nitric acid is exposed to light for longtime.



- (ii) Iron is treated with highly conc. nitric acid.
- (iii) Freshly prepared  $\text{FeSO}_4$  solution is added to equal-volume mixture of conc.  $\text{H}_2\text{SO}_4$  and cons.  $\text{HNO}_3$ . [Q.N.31, 2066]
6. How is nitric acid manufactured by catalytic oxidation of ammonia? Sketch a well-labelled diagram for it. What are the actions of:
- Conc. nitric acid upon iron.
  - Dilute nitric acid upon Magnesium.
  - A mixture of  $\text{HNO}_3$  conc.  $\text{HCl}$  upon gold. [Q.N.31, 2068]
- Why is conc. nitric acid stored in dark brown bottle?
7. Describe Haber's process for the manufacture of ammonia. Why is  $\text{NH}_3$  not dried over conc.  $\text{H}_2\text{SO}_4$  and anhydrous  $\text{CaCl}_2$ ? What is the action when ammonia is passed to mercurous nitrate paper and  $\text{FeSO}_4$  solution? 6+2+2 [Q.N. 31, Set 'A' 2069]
8. Explain the principle involved in the manufacture of nitric acid by oxidation of ammonia. Sketch a well-labelled diagram for it. What happens when:
- Conc. nitric acid is exposed to air
  - Copper turning is treated with conc.  $\text{HNO}_3$ .
  - Excess ammonia is treated with  $\text{Cl}_2$ .
- Mention any two uses of nitric acid [Q.N. 31, Supp. 2069]
9. Describe the principle and draw a self explanatory sketch for the manufacture of ammonia by Haber's synthesis. How does ammonia react with: [Q.N.30, 2070 'C']
- $\text{CO}_2$  gas
  - $\text{CuSO}_4$  solution
  - Na-metal
  - Chlorine in excess

## Unit 11 - Non-metals (II)

### 11.1 Halogens (Chlorine, Bromine and Iodine)

#### Very Short Questions

(All questions are of equal value, 2 marks each.)

- Why are the halogens never found in the free state in nature? [Group A, Q.N.15, 2051]
- A test tube contains a solution of one of the following salts:  $\text{NaCl}$ ,  $\text{NaBr}$ . and  $\text{NaI}$ . Describe a single test that can distinguish among these salts. [Q.N.16, 2054]
- Give any one chemical reaction to prepare chlorine gas from hydrochloric acid. [Q.N.15, 2056]
- Give a chemical reaction to show oxidising action of chlorine. [Q.N.15, 2057]
- How would you obtain bromine from  $\text{HBr}$ ? [Q.N.15, 2058]
- What happens when  $\text{KBr}$  is heated with conc.  $\text{H}_2\text{SO}_4$  acid? [Q.N.19, 2061]
- Why can't  $\text{HI}$  be prepared by the action of conc.  $\text{H}_2\text{SO}_4$  on  $\text{NaI}$ ? [Q.N.13, 2062]
- What happens when the precipitate obtained by the addition of  $\text{AgNO}_3$  solution on sodium chloride is treated with ammonia solution? [Q.N. 16. 2063]
- Why can't  $\text{HBr}$  and  $\text{HI}$  be prepared by treating conc.  $\text{H}_2\text{SO}_4$  with bromide and iodide? [Q.N. 15, Set 'A' 2069]

#### Short Questions

(All questions are of equal value, 5 marks each.)

- Describe how  $\text{HI}$  is prepared. Why it cannot be prepared in the same way as  $\text{HCl}$ ? [Q.N.25, 2061]

2. How is bromine manufactured from carnallite ? [Q.N. 26, 2063]
3. Describe the manufacture of bromine from carnallite. [Q.N. 26, 2064]
4. Write down the principle for the preparation of hydroiodic acid (HI) in laboratory. How does HI react with :
  - (i)  $\text{MnO}_2$
  - (ii)  $\text{CuSO}_4$  solution [Q.N. 26, 2065]
5. (a) What happens when gas obtained by heating NaCl and Conc.  $\text{H}_2\text{SO}_4$  is passed through hot and conc. Solution of NaOH?  
(b) Why can't HI be prepared by heating NaI with conc.  $\text{H}_2\text{SO}_4$ ? [Q.N. 26, 2066]
6. Give suitable balanced chemical reaction for each :
  - (i) Laboratory preparation of HCl.
  - (ii) Laboratory preparation of HI.How would you test the presence of  $\text{Cl}^-$  ion in the aqueous solution ? [Q.N. 26, 2067]
7. Give an account of the manufacture of bromine from Carnallite. How does bromine react with hot and conc. NaOH ? [Q.N. 28, 2068]
8. Compare and contrast the properties of HCl, HBr and HI. [Q.N. 24, Supp. 2068]
9. Compare and contrast the properties of HCl, HBr and HI [Q.N. 26, Set 'A' 2069]
10. Why can't HBr and HI be prepared by the action of conc.  $\text{H}_2\text{SO}_4$  on bromide and iodide respectively? Suggest alternative methods for the preparation of HBr and HI. How would you test chloride ion in the aqueous solution? [Q.N. 28, Set 'B' 2069]
11. Give an account of the manufacture of bromine from carnallite. How does bromine react with ammonia. [Q.N. 28, Supp. 2069]
12. Write an account the manufacture of bromine from carnallite. How does bromine reacts with hot and conc. NaOH? [Q.N. 25, 2070 'C']
13. How is bromine manufactured from carnallite. Write any one use of bromine. [Q.N. 28, 2070 'D']

### Long Questions

(All questions are of equal value, 10 marks each.)

1. What happens when:
  - (a) Sodium chloride is heated with manganese dioxide and conc. sulphuric acid. [Group B, Q.N.7 (b), 2052]
  - (b) Sodium chloride is heated with Manganese dioxide and Conc. Sulphuric acid. [Q.N.27 (a), 2054]
  - (c) Concentrated HCl is added to  $\text{KMnO}_4$ . [Q.N.27 (c), 2055]
  - (d) Chlorine gas is passed into a dilute solution of caustic soda. [Q.N.32 (iv), 2059]
2. How is bromine manufactured? How does it react with (a) KI solution (b) hot NaOH solution (c)  $\text{SO}_2$  solution? [Q.N.31, 2058]
3. How is bromine manufactured ? How does it react with (a) KI solution (b) hot NaOH solution (c)  $\text{SO}_2$  solution ? [Q.N.32, 2061]

## 11.2 Carbon

### Very Short Questions

(All questions are of equal value, 2 marks each.)

1. Carbon monoxide is used as a reducing agent in metallurgy but not carbon dioxide. Why ? [Group A, Q.N.24, 2052]
2. Define the terms 'allotropes' with examples. [Q.N.12, 2056]
3. What happens when carbon monoxide is passed over heated finely divided nickel? [Q.N.18, 2058]



4. What happens when a piece of burning magnesium is dropped into a jar full of carbondioxide? [Q.N.15, 2059]
5. What happens when oxalic acid crystals are heated with concentrated sulphuric acid? [Q.N.14, 2060]
6. Why is carbon used as the most common reducing agent in thermal metallurgy? [Q.N.17, 2060]
7. What is dry ice? Why is it called so? [Q.N.14, 2061]
8. Why is that carbon-monoxide is extremely poisonous? [Q.N.18, 2061]
9. What is meant by allotropy? Give examples of crystalline allotropes of Carbon. [Q.N. 13, 2063]
10. Write a chemical reaction to show the reducing action of CO. [Q.N. 13, 2064]
11. How would you convert CO into CO<sub>2</sub> and vice versa? [Q.N. 14, 2065]
12. What happens when gas obtained by heating oxalic acid in presence conc. H<sub>2</sub>SO<sub>4</sub> is passed through heated caustic soda? [Q.N.15, 2066]
13. What is allotropy? Name the latest discovered allotropic form of carbon. [Q.N. 15, 2067]
14. What happens when carbon dioxide is [Q.N. 16, Supp. 2068]
  - i) heated with finely divided nickel?
  - ii) passed through NaOH solution?
15. What happens when the gas obtained by heating oxalic acid and conc. H<sub>2</sub>SO<sub>4</sub> is passed through: [Q.N. 16, Set 'A' 2069]
  - i) NaOH solution
  - ii) Finely divided Nickel
16. Write a balanced chemical reaction for the preparation of carbon monoxide from oxalic acid. What happens when carbon monoxide is heated with Nickel powder. 1+1 [Q.N. 15, Supp. 2069]

### Short Questions

(All questions are of equal value, 5 marks each.)

1. How carbon-monoxide is prepared in the laboratory? [Group B, Q.N.4, 2051]
2. Give the laboratory method of preparation of carbon monoxide. [Group B, Q.N.4, 2053]
3. How is carbon monoxide prepared in the laboratory? [Q.N.25, 2055]
4. How is carbon monoxide gas prepared in the laboratory from oxalic acid crystals? [Q.N.26, 2056]
5. Define allotropy. Show that diamond and graphite consist of carbon only. [Q.N.27, 2057]
6. How is carbon monoxide prepared from oxalic acid in the laboratory? Give its action with heated nickel. [Q.N.26, 2059]
7. How is Carbon-monoxide prepared from formic acid in laboratory? Write its action on : [Q.N.26, 2062]
  - (i) Ni
  - (ii) ferric oxide
8. What happens when:
  - (a) Carbon monoxide is passed over finely divided nickel? [Group B, Q.N.7 (d), 2051]
  - (b) a gas obtained from a mixture of marble and dilute hydrochloric acid is passed into lime water till excess? [Q.N.27 (a), 2056]
  - (c) a gas obtained from a mixture of copper turnings and hot conc. Sulphuric acid is passed into chlorine water? [Q.N.27 (b), 2056]

### Long Questions

(All questions are of equal value, 10 marks each.)

1. Write short notes on: [Q.N.33 (a), 2058]
  - (a) Allotropes of carbon

### 11.3 Phosphorous

#### Very Short Questions

(All questions are of equal value, 2 marks each.)

1. What happens when white phosphorous is heated with aqueous caustic soda? [Q.N.14, 2056]
2. What is the effect of heat on ortho phosphoric acid? [Q.N.14, 2059]
3. How is white phosphorous converted to red phosphorous? [Q.N.14, 2057]
4. How is white phosphorous converted to red phosphorous? [Q.N.13, 2061]
5. What happens when white phosphorous is exposed to air? [Q.N.15, 2062]
6. Write chemical action of white phosphorous on:
  - (a) conc. nitric acid
  - (b) aqueous KOH Solution [Q.N. 16, 2064]
7. Give an important use of each of the followings :
  - (a) Red Phosphorous [Q.N. 16(d), 2065]
  - (b) Phosphine [Q.N. 13(c), Supp. 2069]
8. Name any two allotropes of phosphorous. Why is phosphorous stored in water? [Q.N.17, 2066]
9. Write balanced chemical equation for the preparation of phosphine gas in the laboratory. [Q.N. 16, 2067]
10. What happens when:
  - i) White phosphorous is heated with concentrated solution of Caustic Soda? [Q.N.15(ii), 2068]
11. Write molecular formulae of the followings:
  - i) Orthophosphoric acid [Q.N. 16, Set 'B' 2069]
  - ii) Hypophosphorous acid [Q.N. 16 (iii), Set 'B', 2069]
  - iii) Hypophosphoric acid [Q.N. 15(a), 2070 'D']

#### Short Questions

(All questions are of equal value, 5 marks each.)

1. What happens when:
  - (a) White phosphorous is heated with strong caustic potash solution. [Q.N.27 (b), 2055]
  - (b) White phosphorus is allowed to react with hot concentrated aqueous solution of sodium hydroxide. [Q.N.27 (i), 2060]
  - (c) NaOH is heated with yellow phosphorous. [Q.N.28 (e), 2061]
2. The gas produced by the action of white phosphorous with sodium hydroxide is passed through silver nitrate solution? [Q.N. 27,(i) 2063]

#### Long Questions

(All questions are of equal value, 10 marks each.)

1. Write short notes on:
  - (a) Phosphorous allotropes [Group C, Q.N.4 (b), 2051]

### 11.4 Sulphur

#### Very Short Questions

(All questions are of equal value, 2 marks each.)

1. How is the moisture present in  $\text{SO}_2$  gas removed? [Group A, Q.N.17, 2051]
2. Acid rain forms when oxides of sulphur and nitrogen react with water. What are these oxides chemically? [Group A, Q.N.6, 2053]
3. Identify a viscous liquid that react with table sugar ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) giving a charred (black) mass. Give the reaction involved. [Group A, Q.N.23, 2053]
4. Explain with reason, why:
  - a) Conc.  $\text{H}_2\text{SO}_4$  should always be added to  $\text{H}_2\text{O}$  but never  $\text{H}_2\text{O}$  to the acid?
  - b) Sugar is charred in contact with conc.  $\text{H}_2\text{SO}_4$ ? [Q.N.17, 2055]



5. Write any two differences between the bleaching action of  $\text{Cl}_2$  and  $\text{SO}_2$ .  
[Q.N.15, 2060]
6. What happens when  $\text{H}_2\text{S}$  is passed through acidified potassium permanganate solution?  
[Q.N. 15, 2063]
7. Why is conc.  $\text{H}_2\text{SO}_4$  diluted by adding acid into water but not water into acid in the laboratory?  
[Q.N. 15, 2064]
8. Write molecular formulae of the followings:  
i) Hypo  
[Q.N. 16 (iv), Set 'B' 2069]
9. Write the molecular formula of 'Hypo' and also write one use.  
[Q.N. 21, 2070 'C']
10. Write molecular formulae of the following:  
(a) Hypo  
[Q.N. 15(b), 2070 'D']

### Short Questions

(All questions are of equal value, 5 marks each.)

1. How would you show that sulphuric acid acts as:  
a) an acid b) an oxidizing agent c) a dehydrating agent  
[Group B, Q.N.5, 2051]
2. What happens when:  
(a) Sulphur dioxide is passed through potassium iodate solution.  
[Group B, Q.N.7 (a), 2051]  
(b) Hydrogen sulphide is passed through bromine water.  
[Group B, Q.N.7 (a), 2053]  
(c) Sulphur dioxide gas is passed into an aqueous solution of potassium permanganate.  
[Q.N.32 (iii), 2059]  
(d) Sulphur dioxide gas is passed into an aqueous solution of potassium permanganate.  
[Q.N.27 (iii), 2060]  
(e) Carbon monoxide is passed over finely divided nickel at  $80^\circ\text{C}$ .  
[Q.N.28(c), 2061]
3. Compare the bleaching properties of  $\text{SO}_2$  and  $\text{Cl}_2$ .  
[Group B, Q.N.5, 2053]
4. Draw a self explanatory diagram for the manufacture of sulphuric acid by contact process.  
[Group B, Q.N.1, 2053]
5. How is hydrogen sulphide obtained in the laboratory? Draw a labelled diagram and give the reaction involved.  
[Q.N.23, 2054]
6. Give two examples of reactions in which  $\text{H}_2\text{SO}_4$  behaves as:  
i) strong acid, ii) a dehydrating agent, iii) an oxidising agent.  
[Q.N.24, 2054]
7. Write down the flow sheet diagram and principle involved in the manufacture of sulphuric acid.  
[Q.N.26, 2058]
8. Write the chemical reactions involved in the manufacture of sulphuric acid by contact process. How does conc  $\text{H}_2\text{SO}_4$  react with copper turnings?  
[Q.N.27, 2059]
9. How is  $\text{H}_2\text{S}$  gas prepared in the laboratory? Give two reactions to show that  $\text{H}_2\text{S}$  is a reducing agent.  
[Q.N.27, 2061]
10. Describe the preparation of  $\text{H}_2\text{S}$  gas in the laboratory. How does it act upon:  
(a) acidified potassium dichromate solution?  
(b)  $\text{SO}_2$  - water?  
[Q.N. 27, 2064]
11. How is Sulphur dioxide prepared in laboratory? What happens when  $\text{SO}_2$  is passed through acidified solution of potassium permanganate?  
[Q.N. 27, 2065]
12. Write down the principle and sketch a labelled diagram for the laboratory preparation of  $\text{H}_2\text{S}$ . Why is  $\text{H}_2\text{S}$  called an analytical agent?  
[Q.N.27, 2066]
13. Write balanced chemical reactions for the laboratory preparation of  
i) Hydrogen Sulphide ii) Sulphur dioxide  
What happens when a moist red flower is introduced into a gas jar containing  $\text{SO}_2$  gas?  
Give a reaction of each to show:  
i)  $\text{SO}_2$  as an oxidising agent  
ii)  $\text{H}_2\text{S}$  as an analytical agent  
[Q.N.26,2068]

14. What happens when:
  - i. Hydrogen sulphide gas is passed to nitric acid. [Q.N. 27 (ii), supp. 2068]
  - ii. Sulphur is boiled with conc. nitric acid. [Q.N. 27 (iii), Supp. 2068]
15. Write the chemical reaction for the Laboratory preparation of  $H_2S$ . How does Kipp's apparatus work to supply  $H_2S$  gas in salt analysis? 1+4 [Q.N. 27, Set 'A' 2069]
16. Write balanced chemical reactions for the laboratory method of preparation of:
  - a. Hydrogen sulphide
  - b. Sulphur dioxide

What happens when a moist red flower is introduced into a gas jar containing  $SO_2$  gas? Give a reaction of each to show:

  - a.  $SO_2$  as an oxidising agent.
  - b.  $H_2S$  as a reducing agent. 2+1+2[Q.N. 26, Supp. 2069]
17. How is sulphur dioxide prepared in laboratory? What happens when  $SO_2$  is passed through acidified solution of potassium dichromate? [Q.N. 26, 2070 'C']

### Long Questions

(All questions are of equal value, 10 marks each.)

1. Write short notes on:
  - (a) Uses of  $H_2S$  as analytical reagent. [Group C, Q.N.4 (b), 2053]
  - (b) Allotropic forms of sulphur. [Q.N.31 (d), 2055]
2. Describe the preparation of  $SO_2$  in the laboratory. Give its action upon (i)  $Cl_2$  water and (ii) acidified  $K_2Cr_2O_7$ . [Q.N.31, 2057]
3.
  - (i) How is pure hydrogen sulphide gas prepared from commercial ferrous sulphide in the laboratory?
  - (ii) Write the action of the gas on (a) Lead acetate paper (b) Silver powder (c) acidified potassium dichromate solution.
  - (iii) How is the gas used in qualitative analysis? [Q.N.32, 2060]
4. Describe the principle and process for the manufacture of Sulphuric acid with a labelled diagram by contact method. Why is concentrated acid diluted by adding acid into water but not water into acid? What happens when :
  - (a) Copper turning is heated with conc.  $H_2SO_4$
  - (b) Cane sugar is heated with conc.  $H_2SO_4$  [Q.N.31, 2062]
5. Write the principle involved along with a self-explanatory diagram for the manufacture of sulfuric acid by contact process. Give two reactions each to show concentrated sulfuric acid is a :
  - a. Dehydrating agent
  - b. Oxidising agent [Q.N. 32. 2063]
6. Starting from Iron pyrites, how would you obtain Sulphuric acid? Draw a self explanatory sketch for it. How does conc. Sulphuric acid react with (i) Phosphorous, (ii) Sugar? Why is  $SO_3$  not directly absorbed by water? Write molecular formula of hypo. [Q.N. 31, 2067]
7. Draw a self explanatory diagram for the manufacture of sulphuric acid by contact process and explain the principle involved in it. How would you show that sulphuric acid acts on:
  - (a) an acid (b) a dehydrating agent [Q.N. 31, Supp. 2068]
8. Write balanced chemical equation for the preparation of hydrogen sulphide at laboratory and explain with a labelled diagram how Kipp's apparatus works to supply  $H_2S$  gas during salt analysis. [Q.N. 32(a), Set 'B' 2069]
9. Give a chemical reaction to show:
  - i) Conc.  $H_2SO_4$  acts as dehydrating agent
  - ii)  $SO_2$  acts as bleaching agent.
  - iii)  $H_2S$  as an analytical agent. [Q.N. 32(b), Set 'B' 2069]
10. Starting from iron-pyrites, how would you obtain dilute sulphuric acid by contact process? Explain with a labelled diagram. Give the action of Conc.  $H_2SO_4$  on a) sucrose b) HI
 

What is the test of sulphate ion? [Q.N. 31, 2070 'D']



### 11.5. Boron and Silicon

#### Very Short Questions

(All questions are of equal value, 2 marks each.)

- Write the formula of Borax and boric acid. [Q.N.13, 2060]
- Give an important use of each of the followings :  
(a) Boron [Q.N. 16(a), 2065]
- Give an important use of each of the followings :  
(a) Silicon [Q.N. 16(c), 2065]
- Write molecular formulae of the followings:  
i) Borax [Q.N. 16 (i), Set 'B' 2069]
- Mention an important use of each the following.  
(a) Boric acid [[Q.N. 13(d), Supp. 2069]
- Write the formulae and uses of borax and boric acid. [Q.N. 22, 2070 'C']
- Write the molecular formula of each of the followings.  
a) Borax [Q.N. 14(c), 2070 'D']  
b) Silica gel. [Q.N. 15(d), 2070 'D']

### 11.6 Noble Gas

#### Very Short Questions

(All questions are of equal value, 2 marks each.)

- Why are noble gases chemically inert ? [Group A, Q.N.12, 2051]
- What are noble gases ? Write any one use of noble gases. [Q.N. 14, 2063]
- The first ionisation energy of noble gases is higher than that of halogens. Explain. [Q.N. 6, 2064]
- Give an important use of each of the followings :  
(a) Noble gases [Q.N. 16(b), 2065]

### 11.7 Environmental Pollution

#### Very Short Questions

(All questions are of equal value, 2 marks each.)

- How does ozone protect plant and animal life on earth? [Group A, Q.N.17, 2053]
- Why do you think depletion of ozone layer from the atmosphere will be harmful to plant and animal life? [Q.N.14, 2055]
- Name any one gas responsible for the depletion of ozone layer of upper part of our atmosphere. Why is it harmful to living beings, if ozone layer get depleted? [Q.N.13, 2056]
- What is green house effect? [Q.N.22, 2056]
- Name any one pollutant of photochemical smog and state one of its effect. [Q.N.12, 2060]
- What is an ozone layer ? [Q.N.10, 2061]
- What is meant by Greenhouse effect ? Name any one gas contributing to the Greenhouse effect. [Q.N. 20, 2063]
- How does CFC deplete Ozone layer ? [Q.N.14,2068]
- What is meant by acid rain ? Give one major effect of acid rain. [Q.N.16,2068]
- What are the adverse effects caused by photochemical smog? [Q.N. 15, Supp. 2068]
- What are the major components of photochemical smog? Write its effect. [Q.N. 15, Set 'B' 2069]
- Name one major pollutant present in photochemical smog. What is its effect on living being? [Q.N. 16, Supp. 2069]
- How is acid rain formed? 2 [Q.N. 16, 2070 'D']

## Unit 12 – Metal and Metallurgical Principles

### Very Short Questions

(All questions are of equal value, 2 marks each.)

1. Name the process for concentration of sulphide ore. [Group A, Q.N.13, 2051]
2. Which metals can be extracted from the following ores:  
galena, cinnabar and argenite [Group A, Q.N.15, 2052]
3. Distinguish between calcination and roasting. [Q.N.16, 2056]
4. Distinguish between roasting and calcination. [Q.N.16, 2057]
5. Distinguish between calcination and roasting ? [Q.N.11, 2061]
6. What is meant by aluminothermite process ? [Q.N.17, 2062]
7. Define the following terms :  
(i) Roasting [Q.N. 17, 2063]  
(ii) Calcination [Q.N. 18, 2065]
8. What is meant by Slag ? Why is it important in metallurgy ? [Q.N. 18, 2065]
9. What are the main differences between Calcination and roasting? [Q.N.18, 2066]
10. Distinguish between flux and slag with an example of each. [Q.N. 17, 2067]
11. Which process is applied for the concentration of sulphide ore and why ? [Q.N.17,2068]
12. Explain the principle of froth floatation process in the extraction of metals. 2 [Q.N. 17, Supp. 2068]
13. What are the differences between minerals and ores? Give one example of each. [Q.N. 17, Set 'A' 2069]
14. Distinguish between metal and metalloid with one example of each. [Q.N. 17, Set 'B' 2069]
15. Why is aluminothermite process applied for the reduction of  $\text{Cr}_2\text{O}_3$ ? Write a reaction involved in the process? [Q.N. 17, Supp. 2069]
16. What are ores? Name two important ores of copper. [Q.N. 18, Supp. 2069]
17. Distinguish between metal and metalloid with an example of each. [Q.N. 14, 2070 'C']
18. Write a chemical reaction involved in 2  
a) Carbon reduction process [Q.N. 17(a), 2070 'D']  
b) Aluminothermite process [Q.N. 17(b), 2070 'D']

### Short Questions

(All questions are of equal value, 5 marks each.)

1. What is metallurgy ? How metal is extracted from its ore ? [Group B, Q.N.6, 2052]
2. Describe calcination and roasting in the extraction of metal. 2.5+2.5 [Q.N. 28, Supp. 2068]
3. Describe the smelting process in the extraction of metal from their ores. 5 [Q.N. 28, Set 'A' 2069]

### Long Questions

1. (a) Give a brief account of the following terms:  
i) Smelting process [Q.N. 30(a), Set 'B' 2069]  
ii) Aluminothermite process

## Unit 13 – Alkali and Alkaline Earth Metals

### Very Short Questions

(All questions are of equal value, 2 marks each.)

1. What is the main product obtained when sodium is allowed to react with dry ammonia at  $300^\circ\text{C}$ – $4000^\circ\text{C}$ . [Group A, Q.N.8, 2051]
2. Why alkali metals can not be obtained by chemical reduction method? [Group A, Q.N.20, 2053]



3. What are the chemical formulae of caustic soda, washing soda and baking soda? What are their main uses? [Q.N.18, 2055]
4. What happens when a piece of sodium is exposed to air? [Q.N.17, 2056]
5. What happens when a piece of sodium is dropped into water? [Q.N.17, 2057]
6. Write the chemical formulae of washing soda and baking soda. What are their uses? [Q.N.17, 2058]
7. What is the biological importance of sodium? [Q.N.18, 2059]
8. What would happen when the nitrate of an alkali metal is heated? [Q.N.16, 2060]
9. Can Sodium be extracted by the electrolysis of aqueous solution of sodium chloride? If not why? [Q.N.18, 2068]
10. Mention the biological importance of potassium and sodium metals. [Q.N. 18, Set 'A' 2069]
11. How is Caustic Soda converted into:  
i) washing soda ii) baking soda [Q.N. 18, Set 'B' 2069]
12. Can sodium be extracted by the electrolysis of aqueous solution of sodium chloride? If not why? [Q.N. 15, 2070 'C']
13. Starting from the sodium, how would you prepare  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ ? [Q.N. 18, 2070 'D']

### Short Questions

(All questions are of equal value, 5 marks each.)

1. Describe in brief the manufacture of sodium hydroxide by Castner-Kellner's process. [Group B, Q.N.6, 2051]
2. Describe the manufacture of sodium hydroxide by Castner-Kellner cell. [Group B, Q.N.4, 2052]
3. What happens when:  
a) Sodium hydroxide is heated with yellow phosphorus. [Group B, Q.N.7 (a), 2052]
- (b) A piece of sodium is exposed to air. [Q.N.28 (d), 2061]
4. Give the characteristics of alkali metals? [Q.N.21, 2054]
5. Describe the steps involved in the manufacture of sodium carbonate by Solvay's process. [Q.N.22, 2054]
6. How is sodium extracted from sodium chloride using Down's electrolytic cell? [Q.N.28, 2056]
7. Write down the principles involved in the manufacture of caustic soda by Solvay Kellner's process. What is its action upon white phosphorus? [Q.N.28, 2057]
8. Write the principle involved in the extraction of sodium from sodium chloride, and also draw a self-explanatory diagram for the Down's process for the extraction of sodium. [Q.N. 28, 2063]
9. How is sodium hydroxide manufactured? Give a reaction to convert caustic soda into washing soda. [Q.N.29, 2066]
10. Give any two characters of alkaline earth metals. 2+2+1 [Q.N. 27, Set 'B' 2069]

### Long Questions

(All questions are of equal value, 10 marks each.)

1. Describe the manufacture of sodium hydroxide stressing on principle and diagrammatic sketch. How does it react with white and red phosphorus? [Q.N.32, 2058]
2. Describe the extraction of sodium by Down's process. Write the action of sodium with  
(a)  $\text{NH}_3$  (b)  $\text{H}_2\text{O}$  [Q.N.30, 2059]
3. Write short notes on:  
(a) Characteristics of alkali metals [Q.N.33 (c), 2060]
4. Describe the manufacture of sodium carbonate by ammonia soda process. Also mention the function of limestone in the manufacturing process. [Q.N.31, 2061]

5. How is Sodium extracted by Down's process ? Sketch a diagram for Down's cell and write reactions involved. What are the difficulties on obtaining Sodium by this process and how are they removed ? How does Sodium react with :  
 (a) Moist air (b)  $\text{NH}_3$  [Q.N.32, 2062]
6. Explain the principle and process and write a well labelled diagram for the manufacture of Washing Soda by Solvay's Ammonia process. Write the molecular formula of Baking Soda and soda ash. How would you convert  $\text{NaOH}$  into Washing Soda ? [Q.N. 32, 2065]
7. Explain the Chemistry of Down's Process for the extraction of sodium. What happens when :  
 (i) Sodium is treated with ammonia  
 (ii) Washing soda is heated.  
 (iii)  $\text{CO}_2$  is passed through  $\text{NaOH}$  solution.  
 (iv) Sodium burns with carbondioxide.  
 Why is sodium Fire not extinguished by adding water ? [Q.N. 32, 2067]
8. Write the chemical principle and stepwise procedure involved in the manufacture of sodium carbonate by Solvay process and sketch a well-labelled diagram for it. What are the merits if this process ? Give any two use of sodium carbonate. What happens when washing soda is heated ? [Q.N.32,2068]
9. Describe with a neat and well labelled diagram for the extraction of sodium form Down's Process. What happens when a piece of sodium is kept in open atmosphere for long time? 8+2 [Q.N. 32, Supp. 2068]
10. Sketch a well labelled diagram for the extraction of sodium by Down's process and explain the principle involved in the process. [Q.N. 30, Set 'A' 2069]  
 a) Why is sodium metal is kept in kerosine?  
 b) Alkali metal impart characteristic colour to the flame. Give reason.
11. How is sodium extracted by Down's process? [Q.N. 30(b), Set 'B' 2069]
12. Describe the principle involved in the manufacture of Sodium Carbonate by Solvay ammonia process. Sketch a well-labelled diagram for it. Why do alkali metals impart characteristic colours to flame? How would you convert washing soda into soda ash? Give any two uses of sodium carbonate. [Q.N. 32, Supp. 2069]
13. Explain the chemistry of Down's process for the extraction of sodium. What happens when:  
 a) Sodium is treated with  $\text{NH}_3$   
 b) Sodium is exposed to moist air  
 Why is sodium fire not extinguished by adding water in laboratory? [Q.N. 32, 2070 'C']
14. Sketch a well labelled diagram for the manufacture of sodium hydroxide and explain the principle involved in the process. How does it react with  
 a)  $\text{CO}_2$  b)  $\text{Zn}$   
 Write any two uses of sodium hydroxide. [Q.N. 30, 2070 'D']

### 13.1 Alkaline Earth Metals

#### Very Short Questions

(All questions are of equal value, 2 marks each.)

1. Name the alkaline earth metals and write their symbols also. [Group A, Q.N.14, 2051]
2. Give the formulae of Bleaching powder and Blue vitriol. [Group A, Q.N.16, 2051]
3. Give one characteristics relation used as a test for each of the following classes of salts:  
 a) carbonates b) chlorides  
 c) nitrate d) sulphates [Group B, Q.N.1, 2052]
4. Write the chemical formula and one of the uses of epsom salt, plaster of paris and quick lime. [Group A, Q.N.21, 2053]



5. How is quick lime prepared from marble? Give pertinent equation. [Q.N.19, 2055]
6. How is plaster of paris prepared ? [Q.N.16, 2062]
7. Explain with suitable chemical reactions.  
Quick lime produces hissing sound when added into cold water. [Q.N.28(b), 2062]
8. Give the action of :  
(a) Heat on lime stone [Q.N. 18,(ii) 2063]
9. What is meant by slaking of lime ? How is lime water prepared from slaked lime ? [Q.N. 17, 2064]
10. Write down a chemical reaction to prepare plaster of paris from gypsum. Why is plaster of paris suitable for immobilising of broken limbs ? [Q.N. 17, 2065]
11. Starting from quick lime, how would you prepare lime water. What is meant by milk of lime? [Q.N.16, 2066]
12. What happens when:  
(i) Gypsum Salt is strongly heated.  
(ii) Chlorine gas is passed through slaked lime. [Q.N. 18, 2067]
13. Write down the balance chemical reaction for the preparation of:  
(i) Bleaching powder (ii) Epsom salt. [Q.N. 18, Supp. 2068]

### Short Questions

(All questions are of equal value, 5 marks each.)

1. Give the characteristics of alkaline earth metals. [Group B, Q.N.5, 2052]
2. How is bleaching powder manufactured? Give a neat labelled diagram and reactions involved. [Group B, Q.N.6, 2053]
3. Give the principle behind the extraction of calcium and magnesium metals. [Q.N.26, 2055]
4. Give the chemistry of Quick lime. [Q.N.28, 2058]
5. Write down the preparation, properties and uses of bleaching powder. [Q.N. 28, 2064]
6. Give a suitable chemical reaction of each for the preparation of:  
i) Epsom Salt ii) Bleaching powder iii) Quick lime  
What happens when water is added to quick lime ? What is meant by setting of plaster ? [Q.N.29,2068]
7. How would you obtain?  
i) lime water  
ii) plaster of paris from quick-lime  
Mention any one use of bleaching powder. [Q.N. 27, Set 'B' 2069]
8. Write down one method of preparation of each  
a. Quick lime  
b. Bleaching powder  
c. Plaster of paris  
d. Epsom salt  
What is meant by setting of plaster of paris? [Q.N. 29, Supp. 2069]
9. Write the chemistry of quick Lime. [Q.N. 27, 2070 'C']
10. Give the chemistry of quicklime. What happens when water is added to quicklime? [Q.N. 29, 2070 'D']

### Long Questions

(All questions are of equal value, 10 marks each.)

1. Write short notes on:  
(a) Quick lime [Group C, Q.N.4 (d), 2051]  
(b) Extraction of calcium [Q.N.33 (b), 2059]

## Section C: Organic Chemistry

## Unit 14- Introduction to Organic Chemistry

## 14.1 – Fundamental Principles

## Very Short Questions

(All questions are of equal value, 2 marks each.)

- For detection of elements (N, halogens, S) in organic compounds, why is sodium fusion carried out? [Q.N.19, 2057]
- Why is aqueous solution of sodium extract alkaline? [Q.N.19, 2059]
- Why is it necessary to prepare Sodium extract for the detection of foreign elements in organic compounds? [Q.N.22, 2062]
- Why is Lassaigne's extract boiled with concentrated nitric acid while testing for halogen? [Q.N. 21, 2067]
- How would you detect the presence of nitrogen and sulphur together in the organic compound? [Q.N.22, 2068]
- Explain why,
  - Sodium extract is alkaline in nature.
  - Organic compounds are combustible.

[Q.N. 21, 2070 'D']

## Short Questions

(All questions are of equal value, 5 marks each.)

- Define Homologous Series. What are the characteristic features of a homologous series? [Q.N. 29, 2065]
- What is meant by homologous series? Mention any four characteristics of it and write down the structure formulae of the third member of the following homologous series:
  - Alkanamide
  - Alkanol
  - Alkyne
  - Alkanoic acid
- What are homologous? Mention any four characteristics of homologous series. Write down the structure formulae of the third member of the following homologous series.
  - alkanal
  - alkene
  - alcohol
  - alkanoic acid
- Define Homologous series. What are the characteristic feature of homologous series. Give the IUPAC name of the first member of ketone series. [Q.N. 29, 2070 'C']
- Explain why,
  - Sodium extract is alkaline in nature.
  - Organic compounds are combustible.
- Define Homologous series and write its important characteristics. What is the IUPAC name of 1<sup>st</sup> member of ketone? [Q.N. 26, 2070 'D']

[Q.N. 27, Supp. 2069]

## Long Questions

(All questions are of equal value, 10 marks each.)

- Write short notes on:
  - Homology [Q.N.32 (a), 2056]
  - Homologous series [Q.N.33 (d), 2057]
  - $sp^3$  hybridization [Q.N.33 (d), 2058]
  - Homologous series [Q.N.33 (d), 2059]
  - Homologous series [Q.N.33 (a), 2060]
  - Detection of nitrogen in Organic compounds [Q.N.33 (c), 2061]
  - Homologous series. [Q.N. 33,(d) 2063]
  - Homologous series. [Q.N. 33(b), 2064]
  - Functional group. [Q.N. 33(iii), 2066]
  - Detection of nitrogen in the organic compound. [Q.N. 33(iv), 2066]
  - Detection of sulphur and halogens in organic compound. [Q.N.33(iii),2068]
  - Homologous series [Q.N.33(a), Supp. 2068]



- (m) Detection of nitrogen in organic compounds. [Q.N.33(b), Supp. 2068]  
 (n) Homologous series. [Q.N.33(c), Set 'A' 2069]  
 (o) Detection of foreign element in organic compound. [Q.N.33(d), Set 'A' 2069]  
 (p) Characteristics of Homologous Series. [Q.N.33(a), Set 'B' 2069]  
 (q) Detection of halogen and sulphur in organic compounds. [Q.N. 33(d), Supp. 2069]  
 (r) Lassaigne's test of nitrogen. [Q.N.33(d), 2070 'C']

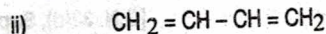
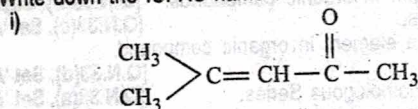
## 14.2 – Nomenclature of Organic Compounds

### Very Short Questions

(All questions are of equal value, 2 marks each.)

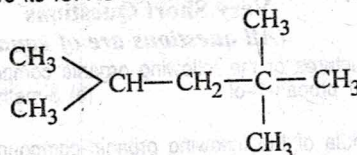
- Write the structures of the following organic compounds:  
 (a) 2-methyl propan-1-ol  
 (b) 3-methyl butanoic acid. [Q.N.21, 2057]
- Give the formula of the following organic compounds.  
 (a) 3-chloro butanal. (b) 2,2-dimethyl propane [Q.N.21, 2059]
- Write the IUPAC name of:  
 (a)  $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{OH}$   
 (b)  $\begin{array}{c} \text{OH} \\ | \\ \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{C} - \text{H} \\ || \\ \text{O} \end{array}$  [Q.N.21, 2062]  
 [Q.N.22, 2061]
- Write the structure of the following organic compounds :  
 (a) 2-ethylpent-1-ene (b) 2-chloro-2, 3-dimethyl pentone [Q.N.22, 2061]
- Write the IUPAC name of the following compounds:  
 (i)  $(\text{CH}_3)_2\text{CHOCH}_3$   
 (ii)  $(\text{CH}_3)_3\text{CCOCH}_2\text{CH}_3$  [Q.N. 22, 2063]
- Write the IUPAC name of :  
 (a)  $(\text{CH}_3)_3\text{CCHBrCH}_2\text{CH}_3$   
 (b)  $\text{CH}_3\text{CH}_2\text{OCH}(\text{CH}_3)_2$  [Q.N. 21, 2064]
- Write down the IUPAC name of the following compounds :  
 (i)  $\begin{array}{c} \text{OCH}_3 \\ | \\ \text{CH}_3 - \text{CH} - \text{CHO} \end{array}$  [Q.N. 22(i), 2065]  
 (ii)  $\begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$  [Q.N. 22(ii), 2065]
- Write down the IUPAC name of the following compounds :  
 (i)  $\begin{array}{c} \text{OH} \quad \text{OH} \quad \text{OH} \\ | \quad | \quad | \\ \text{CH}_2 - \text{CH} - \text{CH}_2 \end{array}$  (ii)  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH} - \text{C} = \text{C} \begin{array}{l} \diagup \text{CH}_3 \\ \diagdown \text{CH}_3 \end{array} \\ | \\ \text{Br} \end{array}$  [Q.N.21, 2066]
- Write down the IUPAC name of the following compounds:  
 (i)  $\begin{array}{c} \text{CHO} \\ | \\ \text{CH} - \text{OH} \\ | \\ \text{CHO} \end{array}$  (ii)  $\begin{array}{c} \text{CH}_3 \quad \text{OH} \\ \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \\ \text{C}_2\text{H}_5 \quad \text{CH}_2\text{OH} \end{array}$  [Q.N. 19, 2067]

10. Write down the IUPAC name of:

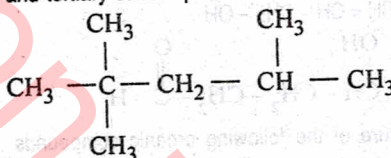


[Q.N. 19, Set 'B' 2069]

11. Indicate the primary, secondary and tertiary Carbon of the following hydrocarbon and give its IUPAC name.

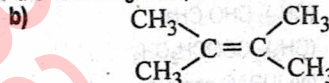
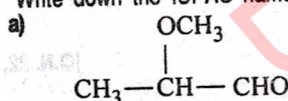


12. Write down the IUPAC name of the following compound and label primary ( $1^\circ$ ) secondary ( $2^\circ$ ) and tertiary carbon present on it.

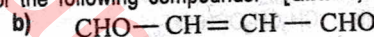
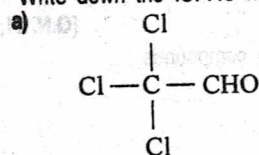


[Q.N. 19, Supp. 2069]

13. Write down the IUPAC name of the following compounds.



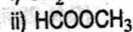
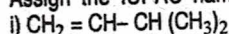
14. Write down the IUPAC name of the following compounds.



### Short Questions

(All questions are of equal value, 5 marks each.)

1. Assign the IUPAC name of following compounds:



[Q.N.19,2068]

### Long Questions

(All questions are of equal value, 10 marks each.)

1. Write short notes on:

(a) IUPAC rules.

[Q.N. 33 (iv), 2067]

## 14.3 – Structure Isomerism in Organic Compounds

### Very Short Questions

(All questions are of equal value, 2 marks each.)

1. Write the isomers of  $\text{C}_4\text{H}_{10}$  and give their IUPAC names.

[Q.N.19, 2056]

2. Write the isomers of  $\text{C}_2\text{H}_6\text{O}$  and give their IUPAC names.

[Q.N.20, 2059]

3. Write the isomers of  $\text{C}_2\text{H}_4\text{O}_2$  and give their IUPAC names.

[Q.N.19, 2060]



- Give the two functional group isomers of  $C_3H_6O$  and write their IUPAC name. [Q.N.22, 2066]
- Write down a functional isomer of  $CH_3-CH_2-OH$  and give its IUPAC name. [Q.N.20, 2068]
- Give two possible isomers of  $C_3H_6O_2$  and write their IUPAC name. [Q.N. 19, Supp. 2068]
- Give possible isomers of  $C_4H_{10}$  and write their IUPAC name. [Q.N. 19, Set 'A' 2069]
- Give a functional isomer of  $CH_3-CH_2-CH_2-OH$  and write its IUPAC name. [Q.N. 21, Supp. 2069]
- Write the functional isomers of  $C_2O_2H_4$  and give their IUPAC name. [Q.N. 18, 2070 'C']

### Short Questions

(All questions are of equal value, 5 marks each.)

- Write the possible isomers of  $C_6H_{14}$  and give their IUPAC names. [Q.N. 29. 2063]
- Define isomerism. Write down two structure isomers and their IUPAC names of each of the following:  
(i)  $C_3H_6O$  (ii)  $C_4H_8$  [Q.N. 28, 2067]

### Long Questions

(All questions are of equal value, 10 marks each.)

- Write short notes on:  
(a) Structure isomerism in Organic Compounds [Q.N.33 (ii), 2062]  
(b) Structure isomerisms in Organic Compound [Q.N. 33(c), 2065]  
(c) Structure isomerism in Organic Compound [Q.N.33(b), Set 'B' 2069]  
(d) Isomerism in Organic compound. (Structure isomer only) [Q.N.33(b), 2070 'D']

### Numerical Problems

(No any questions have been asked in this section upto now.)

## 14.4 - Preliminary Idea of Reaction Mechanism

### Very Short Questions

- Define electrophile and nucleophile with one examples each. [Q.N.20, 2056]
- Define electrophile and nucleophile giving one example from each. [Q.N.22, 2057]
- Define an electrophile and nucleophile giving an example from each. [Q.N.21, 2061]
- Distinguish between electrophile and nucleophile with an example of each. [Q.N. 20, 2065]
- What are Nucleophiles? Give two examples. [Q.N. 20, Supp. 2068]
- What is meant by electrophile? Write suitable example of it. [Q.N. 21, Set 'B' 2069]
- Write short notes on:  
(a) Inductive effect [Q.N. 33, (c) 2063]

## Unit 15 - Hydrocarbon

### 15.1 Sources

#### Very Short Questions

(All questions are of equal value, 2 marks each.)

- A fuel has octane number 80. What does it mean? [Q.N.19, 2062]
- What is meant by the octane number of a fuel is 80? [Q.N. 19, 2064]
- What are anti-knocking agents? Name one important anti-knocking agent. [Q.N. 21, 2065]

- Which terminology is used to grade the quality of fuel? Define the terminology. [Q.N.20, 2066]
- What is the function of Tetraethyl lead (TEL) in gasoline? [Q.N. 22, 2067]
- What is meant by thermal cracking and catalytic cracking? [Q.N. 22, Supp. 2068]
- What is cracking? Mention any one example of it. [Q.N. 21, Set 'A' 2069]
- What major product would you expect when 2-bromopropane is heated with sodium in presence of dry ether. Give the IUPAC name of the product. [Q.N. 20, Supp. 2069]
- What is the function of Tetraethyl Lead (TEL) in gasoline? 2[Q.N. 9, 2070 'C']
- What is the function of Tetraethyl lead (TEL) in gasoline? [Q.N. 22, 2070 'D']

**Short Questions***(All questions are of equal value, 5 marks each.)**(No any questions have been asked in this section upto now.)***15.2 Alkanes (Saturated Hydrocarbons)****Very Short Questions***(All questions are of equal value, 2 marks each.)*

- Show your acquaintance with Wurtz reaction. [Q.N.20, 2058]
- What is Wurtz's reaction? Give an example. [Q.N.22, 2059]
- What happens when aluminium carbide is treated with cold water? [Q.N.21, 2060]
- What happens when Sodium acetate is heated with Soda-lime? [Q.N.20, 2062]
- What is Wurtz's reaction? Give an example. [Q.N.20, 2061]
- A haloalkane 'X' if heated with sodium metal in presence of dry ether produces 2, 3-dimethyl butane as major product. Identify 'X' with chemical reaction. [Q.N. 20, 2064]
- Convert methane to ethane. [Q.N. 22, 2064]
- Write an example of each of the following reaction :  
(i) Wurtz reaction [Q.N. 19(i), 2065]
- Write the Chemical reactions when :  
(i) Bromoethane is heated with sodium metal in presence of dry ether. [Q.N.19 (i), 2066]
- Write one example of each of:  
i) Wurtz reaction [Q.N.22 (i), Set 'A' 2069]
- Write the chemical reaction when, Bromoethane is heated with sodium metal in presence of dry ether. [Q.N. 17, 2070 'C']
- A haloalkane 'X' undergoes Wurtz reaction to give 2, 3-dimethyl butane as the major product. Identify 'X' and write chemical reaction. [Q.N. 20, 2070 'D']

**Long Questions***(All questions are of equal value, 10 marks each.)*

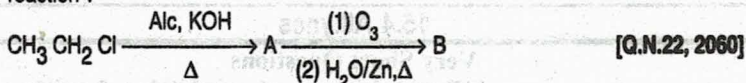
- Write short notes on:  
(a) Isomers of  $C_6H_{14}$  [Q.N.33 (c), 2057]

**15.3 Alkenes****Very Short Questions***(All questions are of equal value, 2 marks each.)*

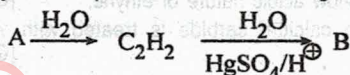
- You are supplied two similar gas jars. One of the jar is filled with ethene while the other with ethyne. Suggest any one suitable chemical test to identify them. [Q.N.20, 2057]
- Describe the Baeyer test. What is observed and what does it identify? [Q.N.19, 2058]



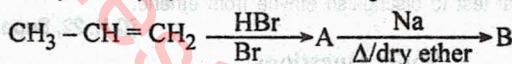
- The ozonolysis of a compound gave acetone as the only product. Identify the compound. [Q.N.21, 2058]
- Write a chemical test to identify alkene from arene. Give reaction wherever possible. [Q.N.20, 2060]
- Identify the unknown organic compounds 'A' and 'B' in the following reaction :



- Identify the compounds A and B in the given reaction. [Q.N. 19. 2063]

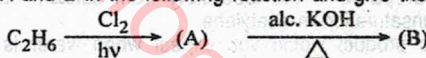


- State Markovnikov's rule. Give an example of it. [Q.N. 21. 2063]
- Write an example of each of the following reaction :  
(i) Markovnikov's rule [Q.N. 19(ii), 2065]
- Identify the major product A and B and give their IUPAC name.



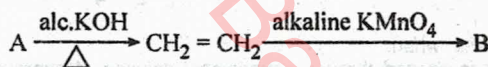
[Q.N.21,2068]

- Identify A and B in the following reaction and give their IUPAC name.



[Q.N. 21, Supp. 2068]

- Identify A and B in the following reaction and give their IUPAC name:



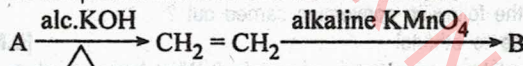
[Q.N. 20, Set 'A' 2069]

- Write one example of each of:

i) Markovnikov's rule

Q.N.22 (ii), Set 'A' 2069]

- Identify the compounds A and B. Give their IUPAC name.



[Q.N. 22, Set 'B' 2069]

### Short Questions

(All questions are of equal value, 5 marks each.)

- What happens when:  
(a) ethene is passed through alkaline potassium permanganate solution. [Q.N.29 (a), 2059]  
(b) benzene is allowed to react with methyl chloride in presence of anhydrous aluminium chloride. [Q.N.29 (i), 2060]
- Describe the preparation of ethene in laboratory. [Q.N. 29, 2064]
- Write short note on :  
(i) Ozonolysis (ii) Markovnikov's rule [Q.N.28, 2066]

### Long Questions

(All questions are of equal value, 10 marks each.)

- Write short notes on:  
(a) Markovnikov's rule [Q.N.32 (b), 2056]  
(b) Polymerization [Q.N.33 (c), 2059]  
(c) Polymerization [Q.N.33 (b), 2061]  
(d) Markovnikov's rule and peroxide effect. [Q.N. 33(c), 2064]  
(e) Laboratory preparation of ethene. [Q.N.33(i), 2068]  
(f) Laboratory preparation of ethene gas [Q.N.33(b), 2070 'C']  
(g) Laboratory preparation of ethene [Q.N.33(a), 2070 'D']

2. How are the following conversion carried out ?  
 (a) Ethene to methanol [Q.N.29 (a), 2061]

### Numerical Problems

(No any questions have been asked in this section upto now.)

## 15.4 Alkynes

### Very Short Questions

(All questions are of equal value, 2 marks each.)

- Give a chemical reaction to show acidic nature of ethyne. [Q.N.21, 2056]
- What gas is obtained when calcium carbide is treated with water? Show equation for this reaction. [Q.N.22, 2058]
- Write the Chemical reactions when :  
 (i) Ethyne is catalytically hydrate. [Q.N.19 (ii), 2066]
- How would you convert ethyne into :  
 (i) ethene (ii) benzene [Q.N. 20, 2067]
- Suggest a chemical test to distinguish ethyne from ethene. [Q.N. 22, Supp. 2069]

### Short Questions

(All questions are of equal value, 5 marks each.)

- How is acetylene prepared in the laboratory from calcium carbide? Give a reaction to detect unsaturation in acetylene. [Q.N.29, 2056]
- (a) What gaseous product would you expect when water is dropped over calcium carbide? Give reaction.  
 (b) What action takes place when the gas obtained from the above reaction is allowed to react with (i) HBr and (ii) dil.  $H_2SO_4$  in presence of  $HgSO_4$ ? [Q.N.29, 2057]
- What happens when:  
 (a) ethyne is passed through ammoniacal solution of cuprous chloride? [Q.N.29 (b), 2059]  
 (b) ethyne is hydrated catalytically? [Q.N.29 (ii), 2060]  
 (c) iodoform is heated with silver powder? [Q.N.29 (iii), 2060]
- How are the following conversion carried out ?  
 (a) Ethyne to ethanol [Q.N.29 (b), 2061]
- How is acetylene prepared in laboratory? What happens when acetylene gas is passed through ammoniacal solution of Silver nitrate? [Q.N.29, 2062]
- How is ethyne prepared in the laboratory? What is Bayer's test?  
 4+1 [Q.N. 29, Supp. 2068]
- How is ethyne prepared in the laboratory? What is Baeyer's test?  
 4+1 [Q.N. 29, Set 'A' 2069]
- Write any two method of preparation of ethyne. What happens when ethyne is  
 i) catalytically hydrated.  
 ii) heated in a red hot iron tube  
 iii) treated with hydrogen in presence of Pd/BaSO<sub>4</sub>  
 2+3 [Q.N. 26, Set 'B' 2069]

### Long Questions

(All questions are of equal value, 10 marks each.)

- Write short notes on:  
 (a) Acidic nature of ethyne [Q.N.33 (c), 2058]  
 (b) Laboratory preparation of ethyne. [Q.N. 33(b), 2065]  
 (c) Laboratory preparation of acetylene. [Q.N. 33 (iii), 2067]  
 (d) Laboratory preparation of ethyne. [Q.N. 33(c), Supp. 2069]