01. Atomic Structure

LONG ANSWER QUESTIONS (8 MARKS)

01. Write the postulates of Bohr's model of hydrogen atom? Discuss the importance of this model to explain various series of line spectra in hydrogen atom.

AP Mar 15, 17, 18, 19, 20, 22; TS Mar 16, 18, 20, 22

02. What are Postulates of Bohr's model of hydrogen atom? Write its limitations. Give any two differences between emission and absorption spectra. AP 15

03. How are the quantum numbers n, ℓ, m, s arrived and explain the significance of these quantum number ? Mar 14; AP Mar 15, 16, 17, 19; TS Mar 15, 16, 17, 18, 19

04. a) Explain the difference between emission and absorption spectra ?

b) Explain i) Aufbau principle ii) Hund's rule iii) Pauli's exclusion principle AP Mar 15

05. What are the Advantages and Limitations of Bohr's model an atom. AP Mar 15

02. Classification of Elements

LONG ANSWER QUESTIONS (8 MARKS)

01. Define IE_1 and IE_2. Why is $IE_2 > IE_1$ for a given atom ? Discuss the factors that effect IE of an element ? AP Mar 15, 16, 17, 18; TS Mar 15, 16, 17, 18, 19

02. What is a periodic property ? How the following properties vary in a group and in a period ? Explain a) Atomic radius b) IE c) EN

d) Electron gain Enthalpy (or) Electronic affinity e) Nature of Oxides

Mar 14; AP Mar 15, 16, 18, 19, 22; TS Mar 15, 16, 17, 18, 19, 20

03. Write an essay on the division of elements into s, p, d and f-blocks.

AP Mar 15,17,19, 20; TS Mar 15, 16, 19

03. Chemical Bonding

LONG ANSWER QUESTIONS (8 MARKS)

01. What do you understand by hybridisation ? Explain different types of hybridisations involving 's' and 'p' orbitals. AP Mar 18; TS Mar 15, 16, 17

SHORT ANSWER QUESTIONS (4 MARKS)

02. Explain the hybridisation involved in $PC\ell_5$ molecule.

May 15, 16; AP Mar 20, 22; TS Mar 18, 20

03. Explain the hybridisation involved in SF_6 molecule. Mar 14; AP Mar 19; TS Mar 19

04. State Fajan's rules, and give suitable examples. AP Mar 15, 19, 22

05. Define dipole moment. Write its applications. AP Mar 17, 20

06. What is hydrogen bond ? Explain the different types of hydrogen bonds with example.
AP Mar 15, 16, 17, 18; TS Mar 16, 18, 19, 22

07. Explain the structure of Ethylene C_2H_4.

08. Explain the formation of coordinate covalent bond with one example. AP Mar 16; TS 17,19

04. States of Matter

SHORT ANSWER QUESTIONS (4 MARKS)

01. Write the postulates of kinetic molecular theory of gases. AP Mar 16, 19; TS Mar 15, 17, 18, 22

02. Deduce (a) Boyle's law (b) Charle's law from kinetic gas equation.
AP Mar 16, 17, 19; TS Mar 15, 17, 20, 22

03. Deduce (a) Graham's law (b) Dalton's law from kinetic gas equation.
AP Mar 19, 20; TS Mar 20

04. Derive an expression for Kinetic energy of gas molecules.

05. State and explain Graham's law of diffusion. Mar 14; AP Mar 17, 19, 20; TS 20

06. State and explain Dalton's law of partial pressures. AP Mar 16, 22; TS 22

07. Derive ideal gas equation. TS Mar 19; TS 16, 18, 19

VERY SHORT ANSWER QUESTIONS (2 MARKS)

08. State Graham's law of diffusion.
AP 16; TS 18,19

09. State Dalton's law of partial pressures. AP 16

10. Which of the gases diffuse faster among N_2, O_2, CH_4 Why ? AP 17, TS Mar 15, 16, 22

11. How many times methane diffuses faster than sulphurdioxide ? TS 19

12. What is aqueous tension ?

13. What is Boltzmann's constant ? Give its value.

14. What is surface tension ? AP Mar 18

15. Calculate kinetic energy of 5 moles of nitrogen at 27°C.
AP Mar 13, May 15,TS Mar 17; SOLVED PROBLEM

05. Stoichiometry

SHORT ANSWER QUESTIONS (4 MARKS)

01. Balance the following equation in acidic medium by ion-electron method.

$Fe^{2+}_{(aq)} + Cr_2O^{2-}_{7(aq)} \rightarrow Fe^{3+}_{(aq)} + Cr^{3+}_{(aq)}$ AP 15,16,18; TS 18

02. Balance the following redox reactions by ion electron method.

$MnO^{-}_{4(aq)} + SO_{2(g)} \rightarrow Mn^{+2}_{(aq)} + HSO^{-}_{4(aq)}$ AP 15; TS 15, 22

03. Balance the following redox reaction by ion-electron method (in acid medium).

$Cr_2O^{-2}_{7(aq)} + SO^{-2}_{3(aq)} \rightarrow Cr^{+3}_{(aq)} + SO^{-2}_{4(aq)}$ TS 16,19; AP 18

04. Write the balanced ionic equation which represents the oxidation of iodide (I^-) ion by permanganate ion in basic medium to give iodine (I_2) and manganese dioxide (MnO_2) ?

$Mn_4^- + I^- \rightarrow Mn_2 + I_2$ Mar 14; AP Mar 19

05. A carbon compound contains 12.8% "C" 2.1% H, 85.1% (Br). The molecular weight of the compound is 187.9, calculate the molecular formula ? AP Mar 17; TS 17, 19

06. A compound contains 4.07% hydrogen 24.27% carbon and 71.65% chlorine. Its molar mass is 98.96 g. What are its empirical and molecular formulae.

AP 17,19,20; TS Mar 17, 20; INTEXT QUESTIONS

VERY SHORT ANSWER QUESTIONS (2 MARKS)

07. Calculate the oxidation numbers of Oxygen in (i) O_2F_2 (ii) OF_2. TS 15,16

08. Calculate the oxidation number of Chromium in (i) $Cr_2O_7^{-2}$ (ii) $K_2Cr_2O_7$. AP 17

09. Calculate the oxidation number of Mn in (i) $KMnO_4$ (ii) K_2MnO_4 (iii) MnO_4^{-2}. AP 15; TS 17, 18

10. Assign Oxidation number to the underlined elements in (i) $NaHSO_4$ (ii) $H_4P_2O_7$.

11. How many number of moles of glucose are present in 540 grams of glucose. AP 17

12. How many number of $CaCO_3$ moles are present 200gms of $CaCO_3$? AP 16

13. Calculate the weight of 0.1 mole of sodium carbonate. AP Mar 16; TS Mar 19, 20

14. The empirical formula of a compound is CH_2O. Its molecular weight is 90. Calculate the molecular formula of the compound. AP Mar 16; TS 22

15. What are disproportionation reactions ? Give example. TS Mar 15, 16

16. What volume of CO_2 is obtained at STP by heating 4g of $CaCO_3$? AP June 09, Mar 12

17. Calculate the molarity of NaOH in the solution prepared by dissolving 4 g in enough water to form 250 mℓ of the solution. AP Mar 18; INTEXT QUESTIONS

06. Thermodynamics

SHORT ANSWER QUESTIONS (4 MARKS)

01. State and explain the Hess law of constant heat summation.

AP Mar 15, 16, 17, 18, 20; TS Mar 15, 16, 18, 19, 20, 22

02. Define heat capacity. What are C_p and C_v ? Show that $C_p - C_v = R$. TS 15

03. State the third law of thermodynamics. What do you understand by it ?

AP May 16; TS May 16, Mar 16,17

04. What are open, closed and isolated systems ? Give one example for each.

05. What are intensive and extensive properties ? AP Mar 15, 19

VERY SHORT ANSWER QUESTIONS (2 MARKS)

06. State the first law of the thermodynamics ? AP Mar 16; TS Mar 18, 22

07. State second law of thermodynamics.

08. State third law of thermodynamics.

09. Give the equation that gives the relationship between ΔU and ΔH. AP 17, 19

10. What is entropy ? AP May 16, TS Mar 17

11. What are the ΔH sign conventions for exothermic and endothermic reactions ? TS 16

07. Chemical Equilibrium

SHORT ANSWER QUESTIONS (4 MARKS)

01. State Le-Chatelier's principle and apply the same to the following equilibrium.
$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$; $\Delta H = -92KJ$ (or) AP 15, 18, 19, 20

State Le-Chatelier's principle and apply it to the synthesis of ammonia by Haber's process. TS 15, 16, 17, 19

02. State and explain Le-Chatelier's principle and apply it to following equilibrium
$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$; $\Delta H = -189KJ$ (or) AP 16; TS 18

State and explain Le-Chatelier principle and apply the same to Contact process.

03. What is Lechatelier's principle? Discuss briefly the factors which can influence the equilibrium.

04. Explain the Bronsted-Lowry acid-base theory with example. AP 16; TS Mar 17, 20

05. Explain Lewis acid-base theory with suitable examples. AP 16

06. Derive the relation between K_c and K_p for equilibrium reaction.

i) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ ii) $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$ AP Mar 15, 19; TS Mar 19, 22

07. State and explain Salt hydrolysis. AP 17

08. What is a conjugate acid-base pair ? Illustrate with examples. AP Mar 14

VERY SHORT ANSWER QUESTIONS (2 MARKS)

09. What is homogeneous equilibrium ? Write two homogeneous reactions. Mar 14; AP Mar 17, 18

10. What is heterogeneous equilibrium ? Write two heterogeneous reactions. AP Mar 17, 18

11. What is ionic product of water? What is its value at room temperature ? AP Mar 14, 17; TS 17

12. Define Basicity of acid and Acidity of base. AP 17, 18; TS 17

13. What is Lewis acid ? Give one example ? AP 15,18; TS 18, 19, 22

14. All Bronsted bases are Lewis bases. Explain.

15. What is a conjugate acid-base pair ? Give example. AP Mar 14

16. Define pH of a solution. Calculate the pH of 0.001M $HC\ell$? TS 15; AP 17

17. What is the pH of 10^{-8} M $HC\ell$? TS Mar 15; NUMERICAL PROBLEMS

18. The concentration of hydrogen ion in a sample of soft drink is 3.8×10^{-3}M. What is its pH?

TEXTBOOK PROBLEMS

19. Calculate the pH of 0.05M H_2SO_4 solution. **AP Mar 16; TS Mar 19**

20. Calculate the pH of 0.001M NaOH .

21. What is the Bronsted base ? Give one example ? **AP Mar 16; TS Mar 19**

08. Hydrogen and Its Compounds

SHORT ANSWER QUESTIONS (4 MARKS)

01. Write the chemical reaction to justify that H_2O_2 can function as oxidising as well as reducing agent. **AP Mar 15, 19; TS Mar 16, 17, 18**

02. Explain, with suitable examples, the following. **Mar 14; AP Mar 16, 17, 19, 20; TS Mar 19, 20**

i) Electron deficient ii) Electron precise and iii) Electron rich hydrides

03. Explain the terms hard water and soft water. Write a note on Calgon method for the removal of hardness of water ? **AP Mar 16, 18, 22; TS Mar 15, 16, 19**

04. Write a few lines on the utility of hydrogen as a fuel. **AP Mar 13, 14, 17; TS 17**

09. s-Block Elements

VERY SHORT ANSWER QUESTIONS (2 MARKS)

01. Lithium reacts with water less vigorously than sodium. Give your reasons. **(IMP) TS Mar 18**

02. What happens when magnesium metal is burnt in air ? **(IMP) AP 17; TS Mar 15, 18, 19**

03. Describe the important of plaster of paris. **AP Mar 16, 17, 18, 19; TS 17**

04. Describe the important uses of caustic soda (or) Sodium hydroxide. **AP Mar 15, 16; TS 18, 19**

05. Describe the important uses of sodium carbonate. **(IMP) AP Mar 20; TS 20**

06. Describe the important uses of quick lime. **Mar 14; AP 19**

07. Why are alkali metals not found in the free state in nature ? **AP Mar 17**

08. Why are IA group elements called as alkali metals ?

09. Why is gypsum added to cement ? **AP 17; TS Mar 15. 19**

10. Why does the solubility of alkaline earth metal hydroxides in water increase down the group ? **AP Mar 20**

11. Potassium carbonate cannot be prepared by solvay process. Why ? **AP Mar 19**

12. Mention the important uses of Mg metal ? **TS 19**

13. Lithium salts are mostly hydrated. Why ? **TS Mar 15, 22**

14. Give an account of the biological importance of Na^+ and K^+ ions ? **AP Mar 18; TS Mar 17, 20**

15. Write the average composition of portland cement.

16. What is the importance of Ca^{+2} in the functioning of cell ? **TS 20**

17. What is Baking soda ? Give its uses.

18. Write completely the electronic configuration of K and Rb.

19. Which of the alkali metals shows abnormal density ? What is the order of the variation of density among the IA group elements ? AP 18

10. p-Block Elements (Group-13)

SHORT ANSWER QUESTIONS (4 MARKS)

01. Explain the structure of Diborane. How is it prepared ?

AP Mar 15, 16, 17, 18, 19; TS Mar 15, 16, 18, 19

02. Explain Borax bead test with a suitable example. AP Mar 18, 20; TS Mar 16, 17, 19, 20

03. Give two methods of preparations of diborane.

How does diborane react with a) H_2O b) CO c) $N(CH_3)_3$ d) NH_3 ?

04. What are electron deficient compounds ? Is $BC\ell_3$ an electron deficient species ? Explain.

AP May 14; TS 22

VERY SHORT ANSWER QUESTIONS (2 MARKS)

05. How do you explain higher stability of $T\ell C\ell$ than $T\ell C\ell_3$?

06. Explain inert pair effect. AP 19; TS Mar 17

07. Why does BF_3 behave as a Lewis acid ?

08. What is the hybridisation of B in diborane and borazine ?

09. Give the formulae of: (a) Borax, (b) Colemanite . AP 18; TS 15, 17

10. Give the formula of borazine. What is its common name ? TS Mar 17

11. p-Block Elements (Group-14)

SHORT ANSWER QUESTIONS (4 MARKS)

01. Explain the difference in properties of diamond and graphite on the basis of their structure.

AP Jun 04, Mar 07, TS Mar 17

02. Why is diamond hard ? AP Mar 11, 13; TS 15, 22

03. What are silicones ? How they are obtained ?

04. What do you understand by

a) Allotropy b) Inert pair effect c) Catenation AP Mar 19

VERY SHORT ANSWER QUESTIONS (2 MARKS)

05. Why is CO poisonous ? AP Mar 16, 17, 18; TS Mar 16

06. What is allotropy ? Give the crystalline allotropes of carbon. AP Mar 15, 16, 19, 20; TS 22

07. How does graphite function as a lubricant ? TS Mar 15, 19, 20

08. Graphite is a good conductor, explain. AP Mar 15, 17

09. Diamond has high melting point, explain.

10. Write the use of ZSM - 5. TS Mar 19, 20

11. C – C bond length in graphite is shorter than C – C bond length in diamond – explain.

12. Name any two man made silicates. AP Mar 14; TS 17; ADD. VSAQ

13. How is water gas prepared ? AP Mar 18

14. How is producer gas prepared?

15. What is the use of dry ice ? Give its applications. AP Mar 15

16. Give the use of CO_2 in photosynthesis. Mar 14; AP 17

17. Give the hybridization of carbon in Mar 14; AP Mar 16; TS Mar 16, 18

a) CO_3^{-2} b) Diamond c) Graphite d) Fullerene e) CO_2

18. What is a Banana bond ?

19. What is Synthesis gas ? TS 18; AP 20

20. Give the hybridisation of carbon in a) CO_3^{-2} b) diamond c) graphite d) fullerene TS 16

21. What are silicones? Give the uses of silicones.

12. Environmental Chemistry

VERY SHORT ANSWER QUESTIONS (2 MARKS)

01. What is Chemical Oxygen Demand (COD) ? Mar 14; AP Mar 15, 16; TS Mar 15, 16, 17, 19

02. What is Bio Chemical Oxygen demand (BOD) ? Mar 14; AP Mar 15, 16, 20; TS Mar 18, 19

03. Define receptor, Sink and Speciation. AP Jun 11, Mar 13, 15, 17, 18; TS 16; ADD. VSAQ

04. What is green house effect ? It is caused by ____ and ____ gases. AP Jun 10; ADD. VSAQ

05. Which oxides cause acid rain ? and what is its pH value ? AP Mar 13

06. Name two adverse effects caused by acid rains. AP Mar 15, 16; TS Mar 15

07. What is PAN ? What effect is caused by it ? AP 19, TS 17

08. Define the terms sink & TLV. AP Mar 12; ADD. VSAQ

09. What is pollutant, contaminant ? ADD. VSAQ

10. What are smoke and mist ?

11. Name the common components of photochemical smog. AP Mar 19; TS 18

12. Acid rains are harmful. Why? (or) Name two adverse effects caused by acid rains.
TS 15,1618; AP 15,17,18

13. What happens when holes are formed in ozone layer? Mention the harmful effects due to depletion of ozone layer. TS 15,16; AP 16

14. What happens when carbon monoxide is increased in air? TS 16

15. Name the important sinks for Carbon dioxide.

16. What is the harm caused by CFC's?

17. What happens when Fluorides are present in water?

18. Explain the strategies adopted in Green chemistry to avoid environment pollution.

13. Organic Chemistry

LONG ANSWER QUESTIONS (8 MARKS)

01. a) Describe the methods of preparation of ethane.

b) Explain the chemical properties of ethane with equations TS 22, AP 17,19

02. Describe two methods of preparation of ethylene. Give equation for the reactions of ethylene with the following. AP Mar 16, 17, 19; TS Mar 18, 20

a) Ozone b) Hypohalous acid

c) Cold and dil.alk. $KMnO_4$ d) Heated with O_2 at high pressure

e) Bromine (Br_2)

03. Give two methods of preparations of Acetylene.

How does it react with a) Water b) Ozone c) Bromine d) Hydrogen

AP Mar 15, 20 ; TS Mar 15, 16, 18, 20

04. How do we get benzene from acetylene? Give the corresponding equation. Explain the halogenation, alkylation, acylation, nitration and sulphonation of benzene?

Mar 14; AP Mar 15, 17, 18, 19, 22; TS Mar 17, 19

SHORT ANSWER QUESTIONS (4 MARKS)

05. How does ethylene react with following.

a) $C\ell_2$ b) HBr c) H_2SO_4 d) O_3 TS 15

06. What is Geometrical isomerism ? Draw cis and trans isomers of the following compounds. Also write their IUPAC names.

i) $CHC\ell = CHC\ell$ ii) $C_2H_5CCH_3 = CCH_3C_2H_5$ AP 22

07. How is a acetylene prepared from the following compounds:

(a) Calcium carbide (b) 1,2 - dibromoethane TS 15

08. (i) How do you get Benzene from Acetylene?

(ii) Explain the halogenation and alkylation of Benzene. AP 15

09. Explain Wurtz reaction & Friedel Craft alkylation with one example for each. TS 15,17

10. Give two examples each for Position and Functional isomerism. AP Mar 16; TS Mar 16, 22

11.Name the products A, B, C and formed in the following reactions. Give the equations for the reactions ? AP Mar 09

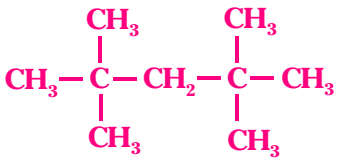
12. Explain Wurtz's Synthesis ? TS Mar 15; AP Mar 17

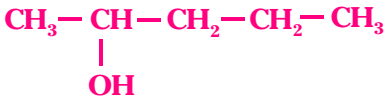
13. Complete the following reaction and name the products A, B and C. AP Mar 04, 05

$$CaC_2 \xrightarrow{H_2O} A \xrightarrow[\text{tube}]{\text{hot metal}} B \xrightarrow{A\ell C\ell_3 + CH_3C\ell} C .$$

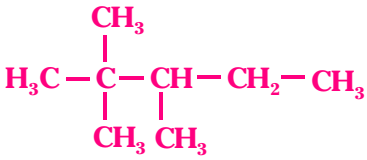
VERY SHORT ANSWER QUESTIONS (2 MARKS)

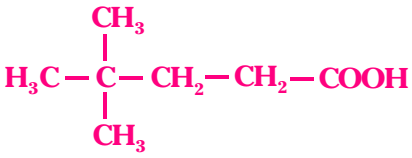
14. Write IUPAC names of the following: **TS 15**

a) 

b) 

15. Write IUPAC names of the following:

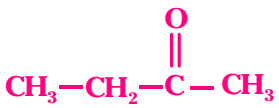
a) 

b) 

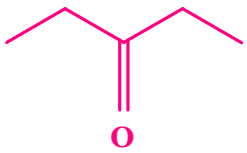
16. Write IUPAC names of the following compounds.

a) $CH_3=CH-C\equiv C-CH_3$ b) $CH_3CH=C[CH_3]_2$

17. Write IUPAC names of the following ? **TS 18, 19**

a) $CH_3-CH_2-CH_2-CH=CH_2$ b) 

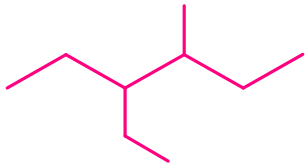
18. Write IUPAC names of the following compounds: **TS 19; AP 16**

a) 

b) 

19. Write IUPAC names of the following compounds:

a) 

b) 

20. Write the structural formulae of the following compounds:

a) Trichloroethanoic acid b) Neo Pentane c) P-nitrobenzaldehyde **TS 22**

21. Write structural formulas of the following compounds: **AP 17**

i) 3, 4, 4, 5 - TetraMethyl Heptane ii) 2-Methyl-1-butene

THE END