PREVIOUS YEAR'S QUESTIONS

CHEMISTRY-1

SECTION – A (2×10=20M)

(VSAQ- CHAP- 4,5,7,9(2), 11(2), 12(2),13 (1)

12.ENVIRONMENTAL CHEMISTRY(2 vsaq)

1. What is chemical oxygen demand?*****
2. What is biochemical oxygen demand? ****
3. Give possible BOD values of clean water and polluted water
4. Which oxides cause acid rain? What is its pH?*****
5. Define receptor, sink & speciation?**
6. Define TLV***
7. What happens when CO is increased in the air?**
8. Name two important sinks for CO.**
9. What are effects of acid rain?*****
10. What is green house effect? Which gases are the cause for it?*****
11. Name the common components of photochemical smog.***
12. What is the harm caused by CFCs?**
13. Name two important sinks for carbondioxide.***
14. What is PAN? What effect is caused by it?***
15. Mention the harmful effects caused due to depletion of ozone layer.***

2. **CLASSIFICATION OF ELEMENTS AND PERIODIC PROPERTIES**

1. An element X has atomic number 34 .Give its position in periodic table *

3. CHEMICAL BONDING

1. what is octet rule*

4.STATES OF MATTER (1vsaq)

1. What is an ideal gas ****
2. State Graham's law of diffusion.*****
3. State Dalton's law of partial pressures.*****
4. Which gas diffuses faster among N_2, O_2 and CH_4 gases? Why?*****
5. Give the values of gas constant R is called universal gas constant***
6. How many times methane diffuses faster than sulphurdioxide?****
7. What is Boltzmann constant? Give its value.**
8. What is most probable speed?**
9. Why pressure cooker is used for cooking food on hills.*****
10. Calculate the kinetic energy of 4 moles of methane at -73°c****
11. Calculate the kinetic energy of 2 moles of nitrogen at 27°c*****
12. Calculate the kinetic energy of 5 moles of nitrogen at 27°c******
13. Calculate the kinetic energy of 3 moles of CO2 at 27°c(in calories)*****
14. Calculate the ratio kinetic energy of 3gm of hydrogen and 4 g of oxygen at a given temperature*****
15. What are isobars**

6. STOICHIOMETRY (1vsaq)

1. How many number of moles of glucose are present in 540g of glucose?*****
2. Calculate the weight of 0.1 mole of Na_2CO_3.*****
3. The empirical formula of a compound is CH_2O. its molecular weight is 90. Calculate the molecular formula of the compound.******

4. What are disproportionation reactions? Give an example.****
5. Determine the oxidation number of sulphur in $H_2S_2O_8$ (Marshall's acid)*
6. What is redox concept*
7. What are comproportionation reaction. Give example**
8. Calculate the oxidation numbers of oxygen in H_2O_2 and O_2F_2?**
9. Calculate the oxidation number of Mn in $KMnO_4$, MnO_4^{-2}?**
10. Calculate the oxidation number of underline element
    a) $NaH\underline{S}O_4$ b) $K\underline{Mn}O_4$ c) $\underline{Cr}_2O_7^{2-}$ d) $\underline{O}F_2$ and $\underline{O}_2F_2$

7.CHEMICAL EQUILIBRIUM (1vsaq)

1. What is homogenous equilibrium? Write two homogeneous reaction.***
2. What is heterogenous equilibrium? Write two homogeneous reaction.***
3. State law of mass action **
4. Write the relation between K_p and K_c.***
5. Give two chemical equilibrium reactions for which $K_p > K_c$ **
6. Give two chemical equilibrium reactions for which $K_p < K_c$ **
7. Give two chemical equilibrium reactions for which $K_p = K_c$**
8. What is Bronsted base? Give an example.*
9. What is dynamic equilibrium.**
10. What is a Lewis acid? Give one example.****
11. What is meant by ionic product of water? What is its value at room temperature***
12. All Lewis acids are not Bronsted acids. Why?*****
13. What is conjugate acid-base pair? Give example.****
14. Derive the K_p and K_c relations for the reaction, $PCl_{5\,(g)} \leftrightarrow PCl_{3\,(g)} + Cl_{2\,(g)}$*
15. Calculate the pH of 0.01M HCl solution.*
16. Calculate the pH of 0.05M H_2SO_4 solution*

9.S-BLOCK ELEMENTS (2vsaq)

1. What happens when magnesium metal is burnt in air.*****
2. Why gypsum is added to cement******
3. Lithium salts are mostly hydrated .Why *****
4. Lithium reacts with water less vigoursly than sodium .Give reason.*****
5. Write biological importance of Na^+ and Ca^{+2} ions ***
6. Write biological importance of Mg^{+2} and Ca^{+2} ions
7. Describe the important uses of Caustic Soda (or) sodium hydroxide.****
8. Describe the important uses of sodium carbonate.****
9. Describe the important uses of quick lime.**
10. What are characteristic colours imparted by group IIA group elements *
11. Which of the two ions Ca^{+2} and Zn^{+2} is more stable and why **
12. Why are alkali metals not found in the free state in nature?**
13. Write chemical name and formula of plaster of paris **
14. Describe the importance of Plaster of Paris**
15. Write the average composition of portland cement.*
16. Write the complete electronic configurations of any two alkaline earth metals.*

P-BLOCK ELEMENTS

11. GROUP 13 ELEMENTS (2vsaq or 1 saq)

1. Why does BF_3 behave as a Lewis acid? ***
2. Give the formula of borazine. What is its common name? ***
3. Explain inert pair effect.*****
4. Give the formulae of (a) Borax b) Colemanite *
5. Give the formula and structure of Borazole (or Borazine). **

6. Sketch the structure of Boric acid.**
7. What is a Banana bond?**

12. **GROUP 14 ELEMENTS: (2vsaq)**

8. How does graphite function as a lubricant?*****
9. Graphite is a good conductor. Explain.*****
10. What is allotropy? Give the crystalline allotropes of carbon. *****
11. Name any two man-made silicates*****
12. What is ZSM-5 Write its use******
13. Why is diamond hard?***
14. Give the hybridisation of carbon in (a) CO_3^{-2} (b) diamond (c) graphite (d) fullerene ******
15. What is the effect of water on tin****
16. Diamond has high melting point.**
17. Give the use of CO_2 in photosynthesis.**
18. Why is CO poisonous?****
19. What is 'producer gas'? How is producer gas prepared? ***
20. How is water gas prepared?**
21. What is Synthesis gas?**
22. Define catenation .Write two allotropic crysatline forms of carbon***

ORGANIC CHEMISTRY (1vsaq)

1. Write IUPAC names and structures of 2-pentanone and 3- pentanone***
2. Write conformations of ethane**
3. Write the structural formulae of the following compounds: a) Trichloroethanoic acid (b) Neo-Pentane c) p-nitro benzaldehyde ******
4. Write chain isomer structures of carbon compound C_4H_{10} ****
5. How is nitrobenzene prepared***
6. Give the structures of the following compounds- (a) 2, 3-dimethyl butane (b) 2-methyl but-1-ene
7. Write the structural formulae of the following compounds: (a) 3,4,4,5- Tetramethyl heptane (b) 2-Methyl-1-butene ***
8. Write IUPAC names and structures of the following: 1,3-butadiene b)2-methyl-2-butene c) 2,3-dimethylbutanaldehyde****
9. Write structures and names of p-nitrobenzaldehyde and m- nitrobenzaldehyde ****

SECTION – B (6×4=24M)

1. ATOMIC STRUCTUREa)

1. Explain differences between absorption and emission spectra*

3. CHEMICAL BONDING

1. Explain sp^3d^2 hybridisation with an example or Explain the structure of SF6 molecule with hybridisation*****
2. Explain the structure of PCl_5 molecule with hybridisation. *****
3. State Fajan's rules with suitable examples.*****
4. Explain coordinate covalent bond with one example****
5. What is hydrogen bond . Explain different types of hydrogen bonds*****
6. State Fajan's rules with suitable examples.*****
7. Explain the example and properties of ionic compounds***

4. STATES OF MATTER

1. Give the important postulates of kinetic molecular theory of gases.*****
2. State and explain Graham's law of diffusion.****
3. Derive the ideal gas equation from gas laws.***
4. Deduce Boyle's law and Charle's law from kinetic gas equation.*****
5. Deduce (a) Graham's law (b) Dalton's law from kinetic gas equation. *****
6. Find RMS velocity, average velocity and most probable velocity of CO_2 gas at 27°C. **
7. At 25°C and 760 mm of Hg pressure a gas occupies 600 ml volume. What will be its pressure at a height where temperature is 10°C and volume of the gas is 640 ml.**

5. STOICHIOMETRY

1. Balance the following redox equation in acidic medium by ion-electron method-***
   $SO_{2(aq)} + Cr_2O_7^{-2}{}_{(aq)} \rightarrow SO_4^{2-}{}_{(aq)} + Cr^{+3}{}_{(aq)}$
2. Balance the following redox reaction by ion-electron method in acid medium:*****
   $MnO^{-}{}_{4\ (aq)} + SO_{2\ (g)} \rightarrow Mn^{+2}{}_{(aq)} + HSO^{-}{}_{4\ (aq)}$
3. Balance the following equation in acid medium by ion-electron method- *****
   $H_2O_{2(\ aq)} + Fe^{2+}{}_{(\ aq)} \rightarrow Fe^{3+} + H_2O$
4. A carbon compound contains 12.8% carbon, 2.1% hydrogen, 85.1% bromine. The molecular weight of the compound is 187.9. Calculate the molecular formula.*****
5. Calculate the empirical formula of a compound having percentage composition: potassium (K) 26.57, Chromium (Cr)=35.36, Oxygen (O) = 38.07. (Given the atomic weights of K, Cr and O as 39; 52 and 16 respectively***
6. Chemical analysis of a carbon compound gave the following percentage composition by weight of the elements present , carbon =10.6% , hydrogen =0.84% , chlorine = 89.10% calculate empirical formula of the compound****

7. THERMODYNAMICS

1. State and explain "Hess law of constant heat summation" with example.*****
2. Define heat capacity? what are C_p and C_v? Show that $C_p - C_v = R$. ****
3. Give the mathematical formulation of first law and third law of thermodynamics.****
4. State and explain the significance of second law of thermodynamics.****

7.CHEMICAL EQUILIBRIUM

1. Derive the relation between Kp & Kc for the equilibrium reaction*****
   (a) $N_{2(g)} + 3H_{2(g)} \leftrightarrow 2NH_{3(g)}$ (b) $2SO_{2(g)} + O_{2(g)} \leftrightarrow 2SO_{3(g)}$
2. Explain the Bronsted-Lowry acid-base theory with example.**
3. What is conjugate acid base pair. illustrate with one example*****
4. Write conjugate acid and conjugate base of each of the following
   a) OH^- b) H_2O c) HCO_3 d) H_2O_2
5. Explain Lewis acid-base theory with examples**
6. State LeChatlier's principle and apply it to the synthesis of ammonia by Haber's process.****
7. Define pH of a solution. Write its significance.*
8. State and explain Salt hydrolysis.*

9.HYDROGEN AND ITS COMPOUNDS

1. Describe electrolytic method for the preparation of H_2O_2.**
2. What is Hardness of water? How is hardness of water removed by Permutit Process (or) ion exchange method or Calgon method.***
3. Write a few lines on the utility of hydrogen as a fuel.*****

4. Write a note on heavy water**
5. Write any four reducing properties of hydrogen peroxide. Give equations.***
6. Name the isotopes of hydrogen. What is the ratio of the masses of these isotopes?*****
7. Explain, with suitable examples, the following: (i) Electron-deficient (ii) Electron-precise Electron-rich hydrides.*****

10.P-BLOCK ELEMENTS (GROUP-13)

1. How is diborane (B_2H_2) prepared? Explain its structure.****
2. Write an essay on the preparation and chemical activities of diborane.**
3. Explain Borax bead test with a suitable examples.*****
4. What are electron deficient compounds? Is BCl_3 an electron deficient species? Explain.****

13.ORGANIC CHEMISTRY

1. Write two methods of preparation of Ethylene. Give the equations.***
2. Explain (a) Position isomerism (b) functional group isomerism with one example for each.*****
3. Explain Wurtz reaction and Friedel Craft alkylation with one example for each.*****

SECTION-C (2×8=16M)

1.ATOMIC STRUCTURE

1. What are 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. *****
2. How are the quantum numbers n, l and m_l arrived at? Explain the significance of these quantum numbers. *****

2.CLASSIFICATION OF ELEMENTS

1. What is periodic property? How the following properties vary in a group and a period? *****
2. Explain (1) Atomic radius (2) Electron gain enthalpy (3) Electro negativity (EN) (4) Ionisation potential (IE).*****
3. 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.***
4. Write an essay on s, p, d and f block elements.***

3.CHEMICAL BONDING (OR) 13. ORGANIC CHEMISTRY

1. What do you understand by hybridisation? Explain different types of hybridisation involving s and p orbitals. *****
2. Given the Molecular Orbital Energy diagram of (a) N_2 (b) O_2. Calculate the respective bond order. Write the magnetic nature of N_2 and O_2 molecules.*****
3. Give an account of VSEPR theory and its applications.***
   Ch.13 : ORGANIC CHEMISTRY
4. Write the preparation of ethane using the following methods: (i) Wurtz reaction (ii) Kolbe's electrolytic method. Or Describe two methods of preparation of ethane. Give any three reactions of ethane.
5. Describe two methods of preparation of Ethylene. Give the equation for the reactions of the ethylene with the following. (a) Ozone (b) Cold and alk. $KMnO_4$***
6. How does acetylene react with following reagents. Give coresponding equations and name products Formed in the reaction, a) water b) hydrogen c) halogens d) hydrogen halides ******
7. Give two methods of preparation of acetylene. How does it react with Water and Ozone? (IMP)
8. How do you get benzene from acetylene . or Describe any two methods of preparation of benzene with corresponding equations. Or Explain the following benzene reactions: (a) Halogenation (b) Alkylation (c) Acylation (d) Nitration e) Sulphonation ******
9. Complete the following reactions and name the products A,B,C,D: **

   (i) $CaC_2 + H_2O \rightarrow A \xrightarrow{\text{Hot metal tub}} B \xrightarrow{AlCl3 / CH3Cl} C$

   (ii) ethylene $\xrightarrow{Br2 / CCl4}$ D