



ÉCOLE GLOBALE

INTERNATIONAL GIRLS' SCHOOL

Dehradun

HOLIDAY HOMEWORK - CLASS XI SCIENCE

CHEMISTRY

1. How can production of hydrogen from water gas be increased by using water gas shift reaction?
2. What are metallic/interstitial hydrides? How do they differ from molecular hydrides?
3. Name the classes of hydrides to which H_2O , B_2H_6 and NaH belong.
4. If same mass of liquid water and a piece of ice is taken, then why is the density of ice less than that of liquid water?
5. Complete the following equations:
 - (i) $\text{PbS (s)} + \text{H}_2\text{O}_2(\text{aq}) \longrightarrow$
 - (ii) $\text{CO (g)} + 2\text{H}_2(\text{g}) \xrightarrow[\text{Catalyst}]{\text{Cobalt}}$
6. Give reasons:
 - (i) Lakes freeze from top towards bottom.
 - (ii) Ice floats on water.
7. What do you understand by the term 'auto protolysis of water'? What is its significance?
8. Discuss briefly de-mineralisation of water by ion exchange resin.
9. Molecular hydrides are classified as electron deficient, electron precise and electron rich compounds. Explain each type with two examples.
10. How is heavy water prepared? Compare its physical properties with those of ordinary water.

1. How do you account for the strong reducing power of lithium in aqueous solution?
2. When heated in air, the alkali metals form various oxides. Mention the oxides formed by Li, Na and K.

3. Complete the following reactions



4. Lithium resembles magnesium in some of its properties. Mention two such properties and give reasons for this resemblance.
5. Name an element from Group 2 which forms an amphoteric oxide and a water soluble sulphate.
6. Discuss the trend of the following:
 - (i) Thermal stability of carbonates of Group 2 elements.
 - (ii) The solubility and the nature of oxides of Group 2 elements.
7. Why are $BeSO_4$ and $MgSO_4$ readily soluble in water while $CaSO_4$, $SrSO_4$ and $BaSO_4$ are insoluble?
8. All compounds of alkali metals are easily soluble in water but lithium compounds are more soluble in organic solvents. Explain.
9. In the Solvay process, can we obtain sodium carbonate directly by treating the solution containing $(NH_4)_2CO_3$ with sodium chloride? Explain.

1. Describe the general trends in the following properties of the elements in Groups 13 and 14.

- (i) Atomic size
- (ii) Ionisation enthalpy
- (iii) Metallic character
- (iv) Oxidation states
- (v) Nature of halides

2. Account for the following observations:

- (i) $AlCl_3$ is a Lewis acid
- (ii) Though fluorine is more electronegative than chlorine yet BF_3 is a weaker Lewis acid than BCl_3
- (iii) PbO_2 is a stronger oxidising agent than SnO_2
- (iv) The +1 oxidation state of thallium is more stable than its +3 state.

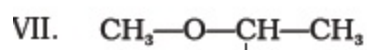
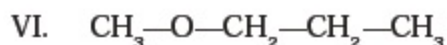
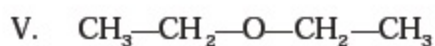
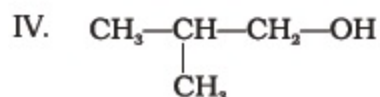
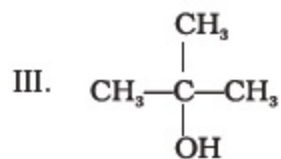
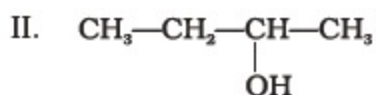
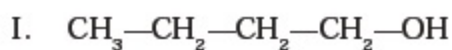
3. When aqueous solution of borax is acidified with hydrochloric acid, a white crystalline solid is formed which is soapy to touch. Is this solid acidic or basic in nature? Explain.

4. Three pairs of compounds are given below. Identify that compound in each of the pairs which has group 13 element in more stable oxidation state.

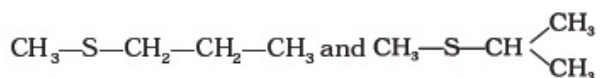
Give reason for your choice. State the nature of bonding also.

5. BCl_3 exists as monomer whereas AlCl_3 is dimerised through halogen bridging. Give reason. Explain the structure of the dimer of AlCl_3 also.
6. Boron fluoride exists as BF_3 but boron hydride doesn't exist as BH_3 . Give reason. In which form does it exist? Explain its structure.
7. (i) What are silicones? State the uses of silicones.
(ii) What are boranes? Give chemical equation for the preparation of diborane.
8. A compound (A) of boron reacts with NMe_3 to give an adduct (B) which on hydrolysis gives a compound (C) and hydrogen gas. Compound (C) is an acid. Identify the compounds A, B and C. Give the reactions involved.
9. A nonmetallic element of group 13, used in making bullet proof vests is extremely hard solid of black colour. It can exist in many allotropic forms and has unusually high melting point. Its trifluoride acts as Lewis acid towards ammonia. The element exhibits maximum covalency of four. Identify the element and write the reaction of its trifluoride with ammonia. Explain why does the trifluoride act as a Lewis acid.
10. A tetravalent element forms monoxide and dioxide with oxygen. When air is passed over heated element (1273 K), producer gas is obtained. Monoxide of the element is a powerful reducing agent and reduces ferric oxide to iron. Identify the element and write formulas of its monoxide and dioxide. Write chemical equations for the formation of producer gas and reduction of ferric oxide with the monoxide.

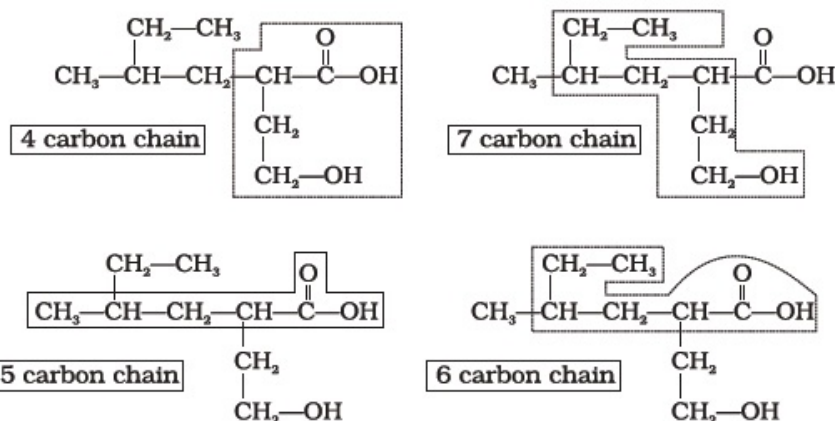
Short Answer Type Questions



1. Which of the above compounds form pairs of metamers?
2. Identify the pairs of compounds which are functional group isomers.
3. Identify the pairs of compounds that represents position isomerism.
4. Identify the pairs of compounds that represents chain isomerism.
5. For testing halogens in an organic compound with AgNO_3 solution, sodium extract (Lassaigne's test) is acidified with dilute HNO_3 . What will happen if a student acidifies the extract with dilute H_2SO_4 in place of dilute HNO_3 ?
6. What is the hybridisation of each carbon in $\text{H}_2\text{C} = \text{C} = \text{CH}_2$.
7. Explain, how is the electronegativity of carbon atoms related to their state of hybridisation in an organic compound?
8. Show the polarisation of carbon-magnesium bond in the following structure.
 $\text{CH}_3\text{—CH}_2\text{—CH}_2\text{—CH}_2\text{—Mg—X}$
9. Compounds with same molecular formula but differing in their structures are said to be structural isomers. What type of structural isomerism is shown by



10. Which of the following selected chains is correct to name the given compound according to IUPAC system.

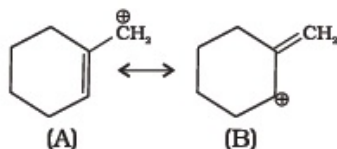


11. In DNA and RNA, nitrogen atom is present in the ring system. Can Kjeldahl method be used for the estimation of nitrogen present in these? Give reasons.
12. If a liquid compound decomposes at its boiling point, which method (s) can you choose for its purification. It is known that the compound is stable at low pressure, steam volatile and insoluble in water.

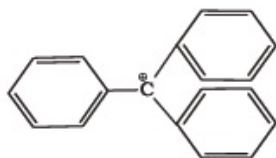
13.

Draw the possible resonance structures for $\text{CH}_3-\ddot{\text{O}}-\overset{+}{\text{C}}\text{H}_2$ and predict which of the structures is more stable. Give reason for your answer.

14. Which of the following ions is more stable? Use resonance to explain your answer.



15. The structure of triphenylmethyl cation is given below. This is very stable and some of its salts can be stored for months. Explain the cause of high stability of this cation.



HYDROCARBONS

Why do alkenes prefer to undergo electrophilic addition reaction while arenes prefer electrophilic substitution reactions? Explain.

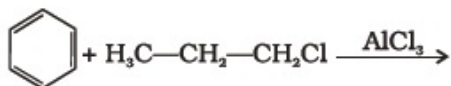
Alkynes on reduction with sodium in liquid ammonia form trans alkenes. Will the butene thus formed on reduction of 2-butyne show the geometrical isomerism?

Rotation around carbon-carbon single bond of ethane is not completely free. Justify the statement.

Draw Newman and Sawhorse projections for the eclipsed and staggered conformations of ethane. Which of these conformations is more stable and why?

The intermediate carbocation formed in the reactions of HI, HBr and HCl with propene is the same and the bond energy of HCl, HBr and HI is $430.5 \text{ kJ mol}^{-1}$, $363.7 \text{ kJ mol}^{-1}$ and $296.8 \text{ kJ mol}^{-1}$ respectively. What will be the order of reactivity of these halogen acids?

What will be the product obtained as a result of the following reaction and why?



How will you convert benzene into

- (i) p - nitrobromobenzene
- (ii) m - nitrobromobenzene

Long Answer Type Questions

1. An alkyl halide $\text{C}_5\text{H}_{11}\text{Br}$ (A) reacts with ethanolic KOH to give an alkene 'B', which reacts with Br_2 to give a compound 'C', which on dehydrobromination gives an alkyne 'D'. On treatment with sodium metal in liquid ammonia one mole of 'D' gives one mole of the sodium salt of 'D' and half a mole of hydrogen gas. Complete hydrogenation of 'D' yields a straight chain alkane. Identify A, B, C and D. Give the reactions involved.
2. 896 mL vapour of a hydrocarbon 'A' having carbon 87.80% and hydrogen 12.19% weighs 3.28g at STP. Hydrogenation of 'A' gives 2-methylpentane. Also 'A' on hydration in the presence of H_2SO_4 and HgSO_4 gives a ketone 'B' having molecular formula $\text{C}_6\text{H}_{12}\text{O}$. The ketone 'B' gives a positive iodoform test. Find the structure of 'A' and give the reactions involved.
3. An unsaturated hydrocarbon 'A' adds two molecules of H_2 and on reductive ozonolysis gives butane-1,4-dial, ethanal and propanone. Give the structure of 'A', write its IUPAC name and explain the reactions involved.
4. In the presence of peroxide addition of HBr to propene takes place according to anti Markovnikov's rule but peroxide effect is not seen in the case of HCl and HI. Explain.

Environmental chemistry- Do 10 questions of NCERT marked in the book.