

Class XI Chemistry Topic- 13.1 Alkanes *Work Sheet (WS – 13. 1)*

A. Fill in the blanks:

- LPG is the abbreviated form of _____ whereas CNG stands for _____.
- If different carbon atoms are joined together to form open chain of carbon atoms with single bonds, they are termed as _____.
- Methane has a _____ structure in alkanes.
- Tetrahedra are joined together in which C-C and C-H bond lengths are _____ pm and _____ pm respectively.
- C–C and C–H σ bonds are formed by _____ overlapping of sp^3 hybrid orbitals of carbon and _____ orbitals of hydrogen atoms.
- _____ is a gas found in coal mines and marshy places.
- _____ are inert under normal conditions as they do not react with acids, bases and other reagents.
- Structural isomers which differ in chain of carbon atoms are known as _____ isomers.
- Carbon atom attached to no other carbon atom as in methane or to only one carbon atom as in ethane is called _____ carbon atom.
- _____ carbon is attached to three carbon atoms and neo or quaternary carbon is attached to _____ carbon atoms.
- Write the IUPAC name of the following compound : $(CH_3)_3 C CH_2 C(CH_3)_3$; _____.
- Write the IUPAC name of the following compound : $(CH_3)_2 C(C_2H_5)_2$; _____.
- Write the IUPAC name of the following compound : ***tetra – tert-butylmethane*** ; _____.
- Write structural formulas of the following compound : ***3, 4, 4, 5–Tetramethylheptane***;
- Write structural formulas of the following compound : ***2,5-Dimethylhexane*** ;
- Dihydrogen gas adds to _____ and _____ in the presence of finely divided catalysts like platinum, palladium or nickel to form alkanes.
- Alkyl halides (except fluorides) on reduction with zinc and dilute hydrochloric acid give _____.
- Alkyl halides on treatment with sodium metal in dry ethereal (free from moisture) solution give higher alkanes. This reaction is known as _____ reaction.
- Sodium salts of carboxylic acids on heating with soda lime (mixture of sodium hydroxide and calcium oxide) give alkanes containing _____ carbon atom less than the carboxylic acid.
- The rate of reaction of alkanes with halogens is F_2 _____ Cl_2 _____ Br_2 _____ I_2 .
- Alkanes on heating in the presence of air or dioxygen are completely oxidized to _____ and _____ with the evolution of large amount of heat.
- Methane reacts with steam at 1273 K in the presence of nickel catalyst to form carbon monoxide and _____.
- The spatial arrangements of atoms which can be converted into one another by rotation around a C-C single bond are called _____ or _____.
- Staggered form has the _____ torsional strain and the eclipsed form, the _____ torsional strain.
- The _____ interaction between the electron clouds, which affects stability of a conformation, is called torsional strain.

Topic- 13.1 Alkanes

Solved Examples 13.1 to 13.6 of NCERT + NCERT Exercise Questions No.-13.2 & 13.14 to 13.16

Solved Examples 13.1 to 13.6 of NCERT

Problem 13.1 Write structures of different chain isomers of alkanes corresponding to the molecular formula C_6H_{14} . Also write their IUPAC names.

Problem 13.2 Write structures of different isomeric alkyl groups corresponding to the molecular formula C_5H_{11} . Write IUPAC names of alcohols obtained by attachment of $-OH$ groups at different carbons of the chain.

Problem 13.3 Write IUPAC names of the following compounds :

- (i) $(CH_3)_3CCH_2C(CH_3)_3$; (ii) $(CH_3)_2C(C_2H_5)_2$; (iii) tetra – *tert*-butylmethane.

Problem 13.4 Write structural formulas of the following compounds :

- (i) 3, 4, 4, 5–Tetramethylheptane; (ii) 2,5-Dimethylhexane.

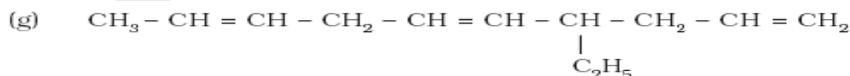
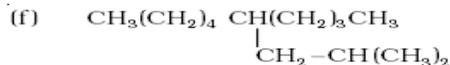
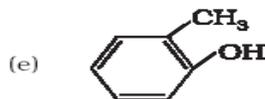
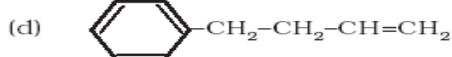
Problem 13.5 Write structures for each of the following compounds. Why are the given names incorrect? Write correct IUPAC names.

- (i) 2-Ethylpentane ; (ii) 5-Ethyl – 3-ethylheptane.

Problem 13.6 Sodium salt of which acid will be needed for the preparation of propane? Write chemical equation for the reaction.

+ NCERT Exercise Questions No.-13.2 & 13.14 to 13.16.

13.2 Write IUPAC names of the following compounds :



13.14 In the alkane $H_3C-CH_2-C(CH_3)_2-CH_2-CH(CH_3)_2$, identify $1^\circ, 2^\circ, 3^\circ$ carbon atoms and give the number of H atoms bonded to each one of these.

13.15 What effect does branching of an alkane chain has on its boiling point?

13.16 Addition of HBr to propene yields 2-Bromopropane, while in the presence of benzoyl peroxide, the same reaction yields 1-Bromopropane. Explain and give mechanism.

NCERT Exercise Questions No.13.3, 13.4 & 13.25.

13.3 For the following compounds, write structural formulas and IUPAC names for all possible isomers having the number of double or triple bond as indicated :

- (a) C_4H_8 (one double bond) (b) C_5H_8 (one triple bond)

13.4 Write IUPAC names of the products obtained by the ozonolysis of the following compounds :

- (i) Pent-2-ene ; (ii) 3,4-Dimethyl-hept-3-ene ; (iii) 2-Ethylbut-1-ene ; (iv) 1-Phenylbut-1-ene.

13.25 Why is Wurtz reaction not preferred for the preparation of alkanes containing odd number of carbon atoms? Illustrate your answer by taking one example.

A. Fill in the blanks:

- _____ are unsaturated hydrocarbons containing at least one double bond.
- The double bond is _____ in bond length than the C–C single bond).
- The presence of weaker π -bond makes alkenes unstable molecules in comparison to _____.
- Strength of the _____ bond (bond enthalpy, 681 kJ mol⁻¹) is greater than that of a carbon-carbon _____ bond in ethane (bond enthalpy, 348 kJ mol⁻¹).
- Write the IUPAC name of the following compound: CH₂ = C (CH₂CH₂CH₃)₂;

- Write the IUPAC name of the following compound: CH₂ = CH – CH = CH₂;

- Write structural formulas of the following compound : 4-Ethyl-2,6-dimethyl-dec-4-ene;

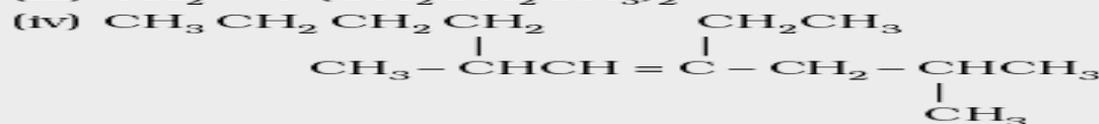
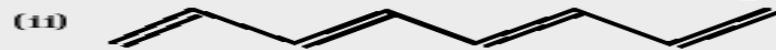
- Cis form of alkene is found to be _____ polar than the trans form.
- The dipole moment of the *trans* form is almost _____ .
- Partially deactivated palladised charcoal is known as _____s catalyst.
- _____ on reduction with sodium in liquid ammonia form _____ alkenes.
- Alkenes show a regular increase in boiling point with increase in size *i.e.*, every – CH₂ group added increases boiling point by _____ - _____K.
- If a water molecule is eliminated from the alcohol molecule in the presence of an acid, this reaction is known as _____ of alcohols.
- _____ rule states that negative part of the addendum (adding molecule) gets attached to that carbon atom which possesses lesser number of hydrogen atoms.
- The secondary carbocation is _____ stable than the primary carbocation.
- _____ of alkenes involves the addition of ozone molecule to alkene to form ozonide, and then cleavage of the ozonide by Zn-H₂O to smaller molecules.
- Alkenes on reaction with cold, dilute, aqueous solution of potassium permanganate (Baeyer's reagent) produce _____ glycols.
- Decolorisation of KMnO₄ solution is used as a test for _____.
- The first stable member of alkyne series is ethyne which is popularly known as _____.
- Ethyne on passing through red hot iron tube at 873K undergoes cyclic polymerization. Three molecules polymerise to form _____ .

Solved Examples 13.7 to 13.14 of NCERT + NCERT Exercise Questions No- 13.5 to 13.12.

Solved Examples 13.7 to 13.14 of NCERT:

Problem 13.7

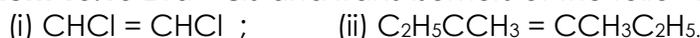
Write IUPAC names of the following compounds:



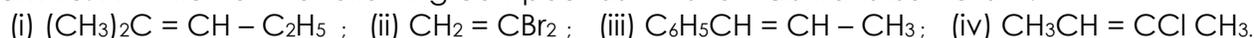
Problem 13.8 Calculate number of sigma (σ) and pi (π) bonds in the above structures (i-iv).

Problem 13.9 Write structures and IUPAC names of different structural isomers of alkenes corresponding to C_5H_{10} .

Problem 13.10 Draw *cis* and *trans* isomers of the following compounds. Also write their IUPAC names :



Problem 13.11 Which of the following compounds will show *cis-trans* isomerism?



Problem 13.12 Write IUPAC names of the products obtained by addition reactions of HBr to hex-1-ene : (i) in the absence of peroxide and (ii) in the presence of peroxide.

Problem 13.13 Write structures of different isomers corresponding to the 5th member of alkyne series. Also write IUPAC names of all the isomers. What type of isomerism is exhibited by different pairs of isomers?

Problem 13.14 How will you convert ethanoic acid into benzene?

NCERT Exercise Questions No.- 13.5 to 13.12.

13.5 An alkene 'A' on ozonolysis gives a mixture of ethanal and pentan-3-one. Write structure and IUPAC name of 'A'.

13.6 An alkene 'A' contains three C - C, eight C - H σ - bonds and one C - C π - bond. 'A' on ozonolysis gives two moles of an aldehyde of molar mass 44 u. Write IUPAC name of 'A'.

13.7 Propanal and pentan-3-one are the ozonolysis products of an alkene? What is the structural formula of the alkene?

13.8 Write chemical equations for combustion reaction of the following hydrocarbons:

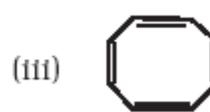


13.9 Draw the *cis* and *trans* structures of hex-2-ene. Which isomer will have higher b.p. and why?

13.10 Why is benzene extra ordinarily stable though it contains three double bonds?

13.11 What are the necessary conditions for any system to be aromatic?

13.12 Explain why the following systems are not aromatic?



NCERT Exercise Questions No.13.13 to 13.23.

13.13 How will you convert benzene into:

(i) *p*-nitrobromobenzene ;

(ii) *m*- nitrochlorobenzene ;

(iii) *p* – nitrotoluene ;

(iv) acetophenone?

13.17 Write down the products of ozonolysis of 1,2-dimethylbenzene (*o*-xylene). How does the result support Kekulé structure for benzene?

13.18 Arrange benzene, *n*-hexane and ethyne in decreasing order of acidic behaviour. Also give reason for this behaviour.

13.19 Why does benzene undergo electrophilic substitution reactions easily and nucleophilic substitutions with difficulty?

13.20 How would you convert the following compounds into benzene?

(i) Ethyne

(ii) Ethene

(iii) Hexane.

13.21 Write structures of all the alkenes which on hydrogenation give 2-methylbutane.

13.22 Arrange the following set of compounds in order of their decreasing relative reactivity with an electrophile, E^+

(a) Chlorobenzene, 2, 4-dinitrochlorobenzene, *p* - nitrochlorobenzene

(b) Toluene, *p* - $H_3C - C_6H_4 - NO_2$, *p* - $O_2N - C_6H_4 - NO_2$.

13.23 Out of benzene, *m*-dinitrobenzene and toluene which will undergo nitration most easily and why?

Class XI Chemistry Topic- 14.1 Environmental Chemistry Work Sheet (WS – 14. 1)

Fill in the blanks:

1. Excess _____ in drinking water can cause disease such as methemoglobinemia ('blue baby' syndrome).
2. At each trophic level, the pollutant gets _____ times concentrated.
3. Fuel obtained from plastic waste has _____ octane rating. It contains no lead and is known as "green fuel".
4. _____ chemistry is a way of thinking and is about utilising the existing knowledge and principles of chemistry and other sciences to reduce the adverse impact on environment.
5. Utilisation of existing knowledge base for reducing the chemical hazards along with the developmental activities is the foundation of _____ chemistry.
6. These days hydrogen peroxide (H_2O_2) is used for the purpose of _____ clothes in the process of laundry.
7. _____ can damage kidney, liver, reproductive system etc.
8. The amount of oxygen required by bacteria to break down the organic matter present in a certain volume of a sample of water, is called _____ .
9. Clean water would have BOD value of less than _____ ppm whereas highly polluted water could have a BOD value of _____ ppm or more.
10. _____ lead to ageing of skin, cataract, sunburn, skin cancer, killing of many phytoplanktons, damage to fish productivity etc.
11. The main reason of ozone layer depletion is believed to be the release of _____ compounds (CFCs), also known as _____ .
12. The upper stratosphere consists of considerable amount of _____ , which protects us from the harmful ultraviolet (UV) radiations ($\lambda = 255 \text{ nm}$) coming from the sun.
13. Photochemical smog occurs where _____ acts on vehicle pollutants.
14. The common components of _____ smog are ozone, nitric oxide, acrolein, formaldehyde and peroxyacetyl nitrate (PAN).
15. _____ smog occurs in warm, dry and sunny climate.
16. _____ smog occurs in cool humid climate. It is a mixture of smoke, fog and sulphur dioxide.
17. _____ pollution occurs due to the presence of undesirable solid or gaseous particles in the air.
18. _____ is released into the atmosphere by respiration, burning of fossil fuels for energy, and by decomposition of limestone during the manufacture of cement.
19. Carboxyhaemoglobin, is about 300 times more stable than the oxygen-haemoglobin complex.
20. About _____ % of the solar energy reaching the earth is absorbed by the earth's surface, which increases its temperature.



Class XI Chemistry Topic- 14.1 Environmental Chemistry Class Assignment (CA– 14. 1)

NCERT Exercise Questions No. 14.1 to 14.5.

- 14.1 Define environmental chemistry.
- 14.2 Explain tropospheric pollution in 100 words.
- 14.3 Carbon monoxide gas is more dangerous than carbon dioxide gas. Why?
- 14.4 List gases which are responsible for greenhouse effect.
- 14.5 Statues and monuments in India are affected by acid rain. How?



Class XI Chemistry Topic- 14.1 Environmental Chemistry Home Assignment (HA– 14. 1)

NCERT Exercise Questions No. 14.6 to 14.11 , 14.13, 14.15 & 14.16.

- 14.6 What is smog? How is classical smog different from photochemical smogs?
- 14.7 Write down the reactions involved during the formation of photochemical smog.
- 14.8 What are the harmful effects of photochemical smog and how can they be controlled?
- 14.9 What are the reactions involved for ozone layer depletion in the stratosphere?
- 14.10 What do you mean by ozone hole? What are its consequences?
- 14.11 What are the major causes of water pollution? Explain.
- 14.13 What do you mean by Biochemical Oxygen Demand (BOD)?
- 14.15 What are pesticides and herbicides? Explain giving examples.
- 14.16 What do you mean by green chemistry? How will it help decrease environmental pollution?