

CHEMISTRY

NCERT - NCERT CHEMISTRY(ENGLISH)

HYDROCARBONS

Solved Example

1. Write the structure of different isomeric alkanes corresponding to the molecular formula C_6H_{14} . Also give their *IUPAC* names.

Strategy: Start with the longest continuous chain with no branching and go on increasing the number of

branching by removing one, two, etc, C atoms from the longest chain and reattaching them, but do not attach them to the terminal C atoms.

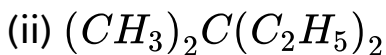
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2. Write the structures of different isomeric alkyl groups corresponding to the molecular formula C_5H_{11} . Also give the *IUPAC* names of alcohols obtained by attachment of the $-OH$ groups to these groups.

Strategy: There are three different skeletons of five C atoms. Pentane has three different type of H atoms, isopentane has four different types of H atoms, and neopentane has only one type of H atoms.

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3. Write IUPAC names of the following compounds :



(iii) tetra -tert-butylmethane



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4. Write structural formulas of the following compounds

:

(i) 3, 4, 4, 5-Tetramethylheptane

(ii) 2,5-Dimethylhexane



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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-methylheptane



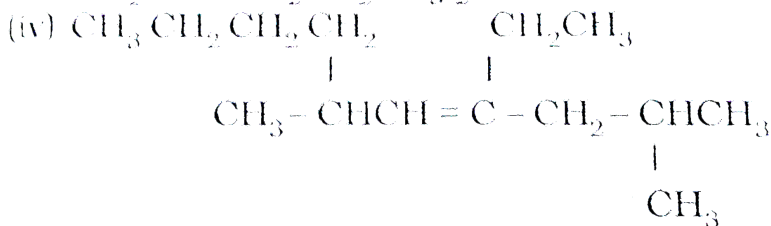
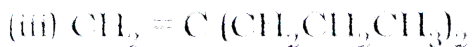
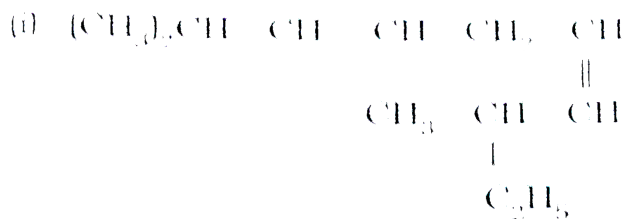
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6. Sodium salt of which acid will be needed for the preparation of propane ? Write chemical equation for the reaction.



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7. Write IUPAC names of the following compounds:



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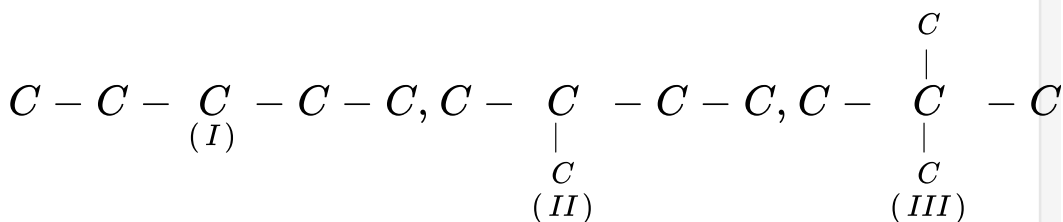
8. Calculate number of sigma (σ) and pi (π) bonds in the above structures (i-iv).



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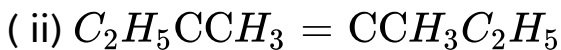
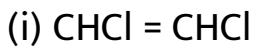
9. Work out all possible structural isomeric alkenes corresponding to C_5H_{10} and also give their *IUPAC* names.

Strategy: Alkene isomers are deduced by writing the different *C* skeletons and then introducing the double bond at different locations. The possible skeletons are



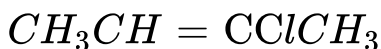
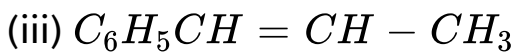
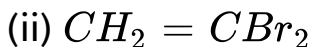
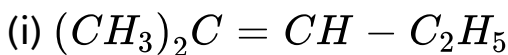
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10. Draw cis and trans isomers of the following compounds. Also write their *IUPAC* names :



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11. Which of the following compounds will show cis-trans isomerism?



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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.

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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?

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14. How will you convert ethanoic acid into benzene?

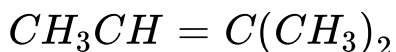
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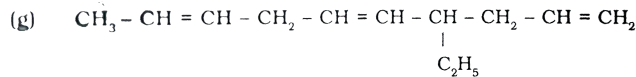
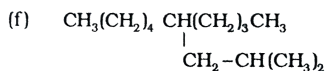
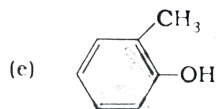
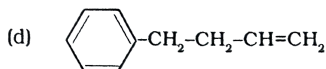
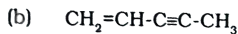
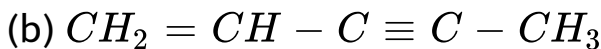
Exercise

1. How do you account for the formation of ethane during chlorination of methane ?

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2. Write IUPAC names of the following compounds : (a)

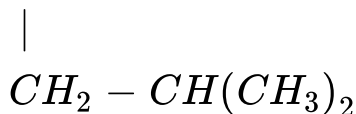




(c)

(d)

(e)



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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)



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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



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



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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'.

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

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8. Write chemical equations for combustion reaction of the following hydrocarbons:

(i) Butane

(ii) Pentene

(iii) Hexyne

(iv) Toluene



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



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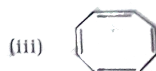
10. Why is benzene extra ordinarily stable though it contains three double bonds?

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

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12. Explain why the following systems are not aromatic?



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13. How will you convert benzene into

(i) p-nitrobromobenzene

(ii) m-nitrochlorobenzene

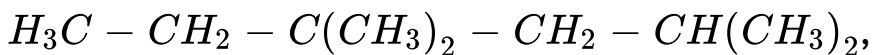
(iii) p -nitrotoluene

(iv) acetophenone



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14. In the alkane



identify 1° , 2° , 3° , carbon atoms and give the number of H atoms bonded to each one of these.



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

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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.

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

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

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19. Why does benzene undergo electrophilic substitution reactions easily and nucleophilic substitutions with

difficulty?



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20. How would you convert the following compounds into benzene?

(i) Ethyne

(ii) Ethene

(iii) Hexane



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



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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,

$p - H_3C - C_6H_4 - NO_2$, $p - O_2N - C_6H_4 - NO_2$.

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

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24. Suggest the name of a Lewis acid other than anhydrous aluminium chloride which can be used during ethylation of benzene.

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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.

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