CHAPTER

7

Nomenclature of Alkanes

International Union of Pure and Applied Chemistry

I U P A C

Abbreviation	IUPAC
Motto	Advancing Chemistry Worldwide
Formation	1919
Type	International chemistry standards organization
Headquarters	Zurich, Switzerland
Region served	Worldwide
Official language	English
President	Mark Cesa
Website	www.iupac.org

The International Union of Pure and Applied Chemistry (IUPAC), is an international federation of National Adhering Organizations that represents chemists in individual countries. It is a member of the International Council for Science (ICSU). The international headquarters of IUPAC is in Zurich, Switzerland. The administrative office, known as the “IUPAC Secretariat”. Is in Research Triangle Park, North Carolina, United States. This administrative office is headed by the IUPAC executive director, currently Lynn Soby.

Creation and history

The need for an international standard for chemistry was first addressed in 1860 by a committee headed by German scientist Friedrich August Kekule von Stradonitz. This committee was the first internatioinal conference to create an international conference to create an international naming system for organic compounds. The ideas that were formulated in that conference evolved into the official IUPAC nomenclature of organic chemistry. The IUPAC stands as a legacy of this meeting, making it one of the most important historical international collaborations of chemistry societies. Since this time, IUPAC has been the official organization held with the responsibility of updating and maintaining official organic nomenclature. IUPAC as such was established in 1919. One notable country excluded from this early IUPAC was Germany. Germany's exclusion was a result of prejudice towards Germans by the allied powers after World War I. Germany was finally admitted into IUPAC during World War II.

Friedrich August Kekule von Stradonitz

During World war II, IUPAC was affiliated with the Allied powers, but had little involvement during the war effort itself. After the war, West Germany was allowed back into IUPAC. Since World War II, IUPAC has been focused on standardizing nomenclature and methods in science without interruption.

ALKANES

In organic chemistry, an **alkane**, or **paraffin** (a historical name that also has other meanings), is a saturated hydrocarbon. Alkanes consist only of hydrogen and carbon atoms and all bonds are single bonds. Alkanes (technically, always acyclic or open-chain compounds) have the general chemical formula $C_nH_{2n\ 2}$. For example, Methane is CH_4, in which n 1 (n being the number of carbon atoms).

☑ SPECIAL TOPIC

WHY ARE ALKANES CALLED PARRAFINS?

Paraffins is a latin word meaning (parum = little + affinis = reactivity). Alkanes are called paraffins because they have a little affinity towards a general reagent. In other words, alkanes are inert substances. They undergo reactions under drastic conditions.

A chemical name typically has four parts in the IUPAC system of nomenclature: prefix, parent, locant, and suffix. The prefix identifies the various substituent groups in the molecule, the parent selects a main part of the molecule and tells how many carbon atoms are in that part, the locants give the positions of the functional groups and substituents, and the suffix identifies the primary functional group.

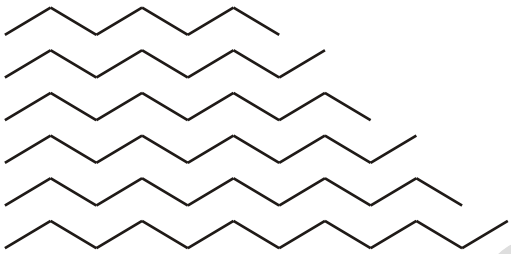
Locant — Prefix — Parent — Suffix

Where are the substituents and functional groups?	What are the substituents?	How many carbons?	What is the primary functional group?

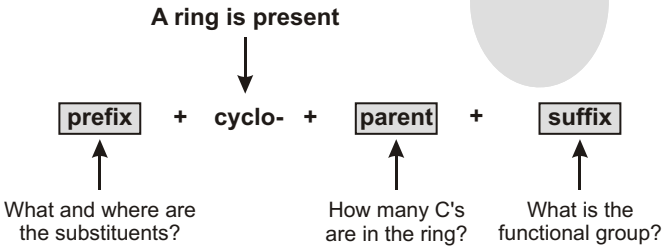
ACYCLIC HYDROCARBON

Methane	CH_4
Ethane	$H_3C — CH_3$
Propane	
Butane	
Pentane	
Hexane	

Heptane
Octane
Nonane
Decane
Undecane
Dodecane



NAMING CYCLOALKANES



CYCLIC HYDROCARBON

Cyclopropane

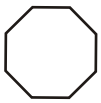
Cyclobutane

Cyclononane

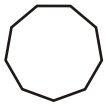
Cyclohexane

Cycloheptane

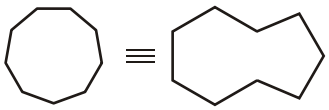
Cyclooctane



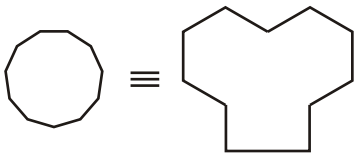
Cyclononane

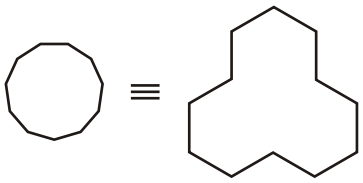


Cyclodecane



Cycloundecane



Cyclododecane 

IUPAC SYSTEM OF NAMING COMPOUNDS

The IUPAC name of any organic compound essentially consists of three parts:

1. Word root **2.** Suffix **3.** Prefix

WORD ROOT

Word root is the basic unit of the name denoting the number of C atoms present in the principal chain (longest possible continuous chain of C atoms including the functional group and multiple bonds).

For C_1 to C_4, the normal common root based on names like meth, -eth-, and prop- are used. For C_5 or more carbon atoms chain, an extra letter (a) is used only if the primary suffix to be added to word root begins with a consonant.

Straight-chain alkanes take the suffix "-ane" and are prefixed depending on the number of carbon atoms in the chain, following standard rules. The first few are :

Number of carbons	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	30	40	50
Prefix	meth	eth	Prop	But	Pent	Hex	Hept	Oct	Non	Dec	Undec	Dodec	Tridec	Tetradec	Pentadec	Eicos	Triacont	Tetracont	Pentacont

SUFFIX

Suffix are of two types.

(i) Primary Suffix : is always added to word root to indicate whether the carbon chain is saturated or unsaturated. For saturated the primary suffix is 'ane'. For unsaturated (one double bond) it is -'ene' and for unsaturated (one triple bond) it is - 'yne'. If the number of double bonds is two or three, then the primary suffix is 'diene' or 'triene'. If there are two triple bonds then it is 'diyne'.

Example:

HC CH ethyne; CH_3 — CH CH_2 propene ; CH_2 CH — CH CH_2 Butadiene

('a' has been added to word root since primary suffix starts with a consonant 'd'.)

HC C — C CH Butadiyne

(ii) Secondary Suffix: is added to primary suffix to indicate the nature of the functional group present in an organic compound.

For alcohol (— OH), -ol is added; for aldehydes (— CHO), -al is added.

For ketones (>C = O), -one is added; for acids (— COOH) -oic acid is added.

While adding the secondary suffix (to represent the functional group), the terminal 'e' of primary suffix is dropped. For example, CH_3CH_2OH is ethanol (e-dropped) and CH_2 = CHCHO is prop-2-en-1-al (e-dropped). However, it is not always dropped. For example, CH_3CH_2CN is propanenitrile (e-not dropped)

It should also be noted that locants are to be placed immediately before the part of the name to which they relate. For example, $\overset{3}{H}C \quad \overset{2}{C} — \overset{1}{C}OOH$ is prop-2-yn-1-oic acid (working name 2-propynoic acid)

IUPAC Name

$Cl\overset{2}{C}H_2\ \overset{1}{C}H_2OH$ is 2-chloroethan-1-ol (working name 2-chloroethanol)

PREFIX

These are also of two types.

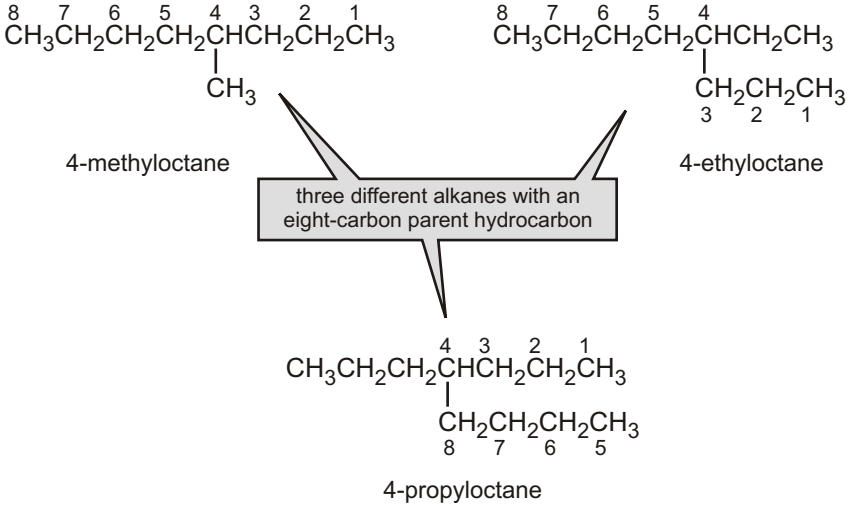
(i) Primary Prefix: It distinguishes between a cyclic and an acyclic compound. In a cyclic compound, the word 'cyclo' is used before the word root, for example,  is cyclopropane. If the prefix is not used, one can take the compound to be of open chain.

(ii) Secondary Prefix: Sometimes, certain groups are not considered functional groups. These are treated as substituents and added before the word root in an alphabetical order. For example, $C_2H_5 — O — C_2H_5$ is ethoxy ethane. In this, the secondary prefix is 'ethoxy', the word root is 'eth', and the primary suffix is 'ane'.

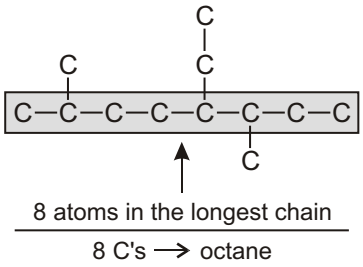
THE NOMENCLATURE OF ALKANES

The systematic name of an alkane is obtained using the following rules:

Determine the number of carbons in the longest continuous carbon chain. This chain is called the parent hydrocarbon . The longest continuous chain is not always in a straight line; sometimes you have to "turn a corner" to obtain the longest continuous chain.

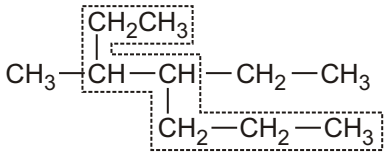


Find the parent carbon chain and add the suffix.



Rule 1 :

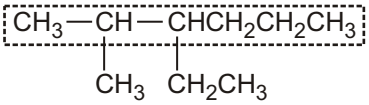
Longest chain rule : Select the longest continuous chain of carbon atoms. This is called the parent chain while all other carbon atoms which are not included in the parent chain are called branch chains or side chains or substituents.



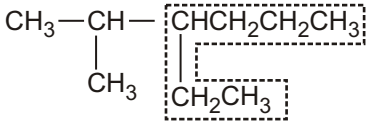
Longest chain contains seven carbon atoms and hence is named as a derivative of heptane

Rule 2 :

Rule for larger number of side chains : If two chains of equal lengths are possible, select the one with the larger number of side chains. For example,

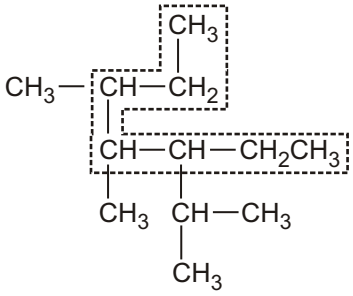


Named as hexane with **two** alkyl substituents (Correct)

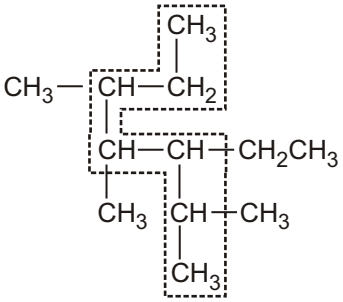


Named as hexane with **one** alkyl substituent (Wrong)

The series are called homologs. For example, butane is a homolog of propane, and both of these are homologs of hexane and decane.



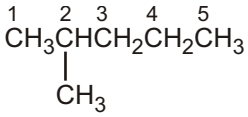
wrong
seven-carbon chain, but only three substituents



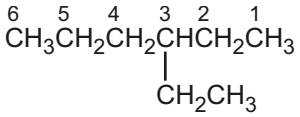
right
seven-carbon chain, four substituents

Rule 3 :

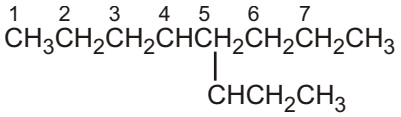
The name of any alkyl substituent that hangs off the parent hydrocarbon is placed in front of the name of the parent hydrocarbon, together with a number to designate the carbon to which the alkyl substituent is attached. The carbons in the parent chain are numbered in the direction that gives the substituent as low a number as possible. The substituents name and the name of the parent hydrocarbon are joined into one word. preceded by a hyphen that connects the substituent's number with its name.



2-methylpentane
not
4-methylpentane

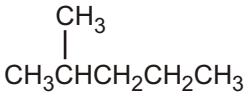


3-ethylhexane
not
4-ethylhexane



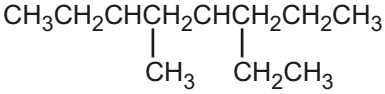
4-propyloctane
not
5-propyloctane

Only systematic names have numbers; common names never contain numbers



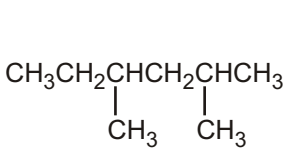
common name : isohexane
systematic names : 2-methypentane

If more than one substituent is attached to the parent hydrocarbon, the chain is numbered in the direction that will produce a name containing the lowest of the possible numbers.

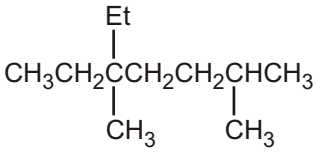


3-ethyl-5-methyloctane
not
4-ethyl-6-methyloctane
because 3 < 4

If two or more substituents are the same, the prefixes “di,” “tri,” and “tetra” are used to indicate how many identical substituents the compound has. The numbers indicating the locations of the identical substituents are listed together, separated by commas. There are no spaces on either side of a comma. There must be as many numbers in a name as there are substituents. The prefixes “di,” “tri,” “tetra,” “ sec ,” and “ tert ” are ignored in alphabetizing substituents.

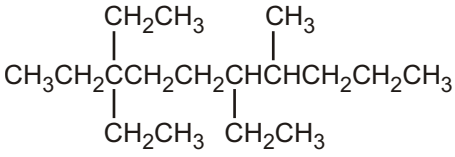


2,4-dimethylhexane

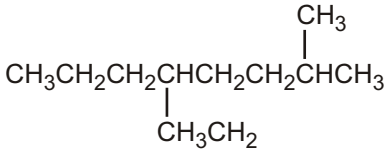


5-ethyl-2, 5-dimethylheptane

numbers are separated by a comma;
a number and a word are separated by a hyphen



3,3,6-triethyl-7-methyl decane



5-ethyl-2-methyloctane

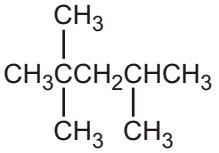
MISTAKES TO AVOID

Adding of punctuation:

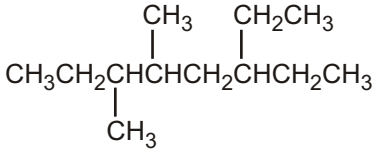
1. Commas are put between numbers (2, 5, 5 becomes 255)
2. Hyphens are put between a number and a letter (2,5,5 trimethylheptane becomes 2,5,5-trimethylheptane).
3. Successive words are merged into one word (trimethyl heptane becomes trimethylheptane)
   - ❑ **NOTE :** IUPAC uses one-word names throughout. This is why all parts are connected.
4. When assigning the numbers (*i.e.*, the locants) while naming an organic compound there is NO rule based on summing the numbers.

Rule 4 :

1. When numbering in either direction leads to the same lowest number for one of the substituents, the chain is numbered in the direction that gives the lowest possible number to one of the remaining substituents.

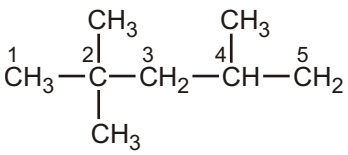


2,2,4-trimethylpentane
not
2,4,4-trimethylpentane
because 2 < 4

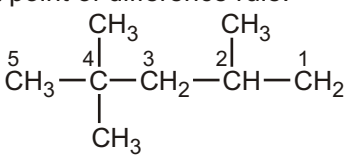


6-ethyl-3,4-dimethyloctane
not
3-ethyl-5,6-dimethyloctane
because 4 < 5

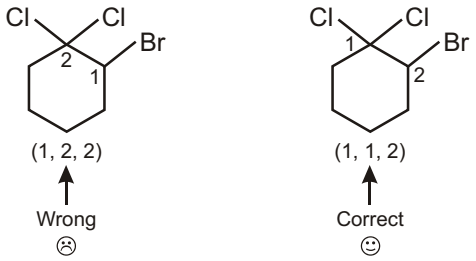
2. **Lowest set of locants rule :** *When two or more substituents are present, the lowest set of locants rule is applied*. According to this rule when two or more different sets of locants containing the same number of terms is possible, then that set of locants is the lowest which when compared term by term with other sets, each in order of increasing magnitude, has the lowest term at the first point of difference.
   That is why this rule is also sometimes called as first point of difference rule.



Set of locants = 2, 2, 4 (correct)

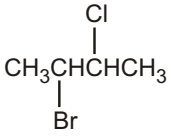


Set of locants = 2, 4, 4 (wrong)

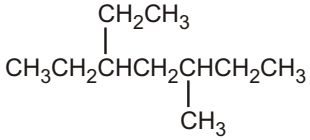


Rule 5 :

If the same substituent numbers are obtained in both directions, the first group listed receives the lower number (according to alphabetical order).



2-bromo-3-chlorobutane
not
3-bromo-2-chlorobutane



3-ethyl-5-methylheptane
not
5-ethyl-3-methylheptane

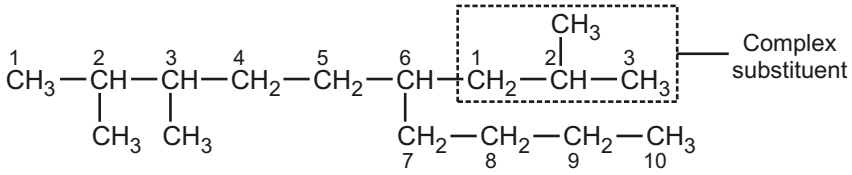
Rule 6 :

NAMING OF COMPLEX SUBSTITUENT

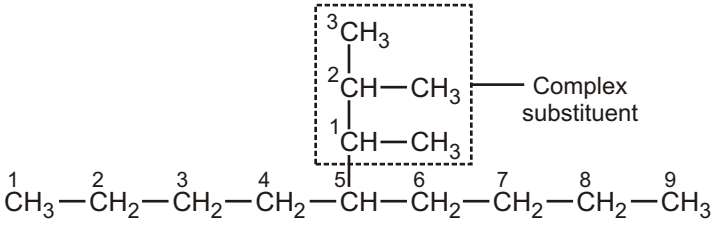
Alkyl group, R-	**Common name**	**Complex name** (if different)
CH_3-	methyl-	
CH_3CH_2-	ethyl-	
$CH_3CH_2CH_2$-	propyl-	
$(CH_3)_2CH$-	isopropyl-	(1-methylethyl)-
$CH_3CH_2CH_2CH_2$-	butyl-	
$CH_3-CH_2-\underset{\displaystyle CH_3}{\overset{\displaystyle |}{CH}}-CH_3$	sec-butyl- or s-butyl	(1-methylpropyl)-
$(CH_3)_2CHCH_2$-	isobutyl	(2-methylpropyl)-
$(CH_3)_3C$-	tert-butyl or t-butyl	(1,1-dimethylethyl)-

NUMBERING THE COMPLEX SUBSTITUENT

(a) In case the substituent on the parent chain is complex (*i.e.*, it has branched chain), it is named as a substituted alkyl group by numbering the carbon atom of this group attached to the parent chain as 1. The name of such a substituent is always enclosed in brackets to avoid confusion with the numbers of the parent chain. For example,



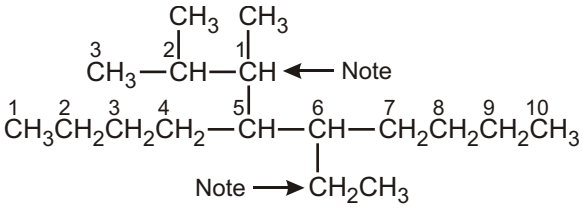
2, 3-Dimethyl-6-(2-methylpropyl)decane



5-(1, 2-Dimethylpropyl) nonane

(b) While deciding the alphabetical order of the various substituents, the name of the complex substituent is considered to begin with the first letter of the complete name, eventhough di, tri, iso, neo.

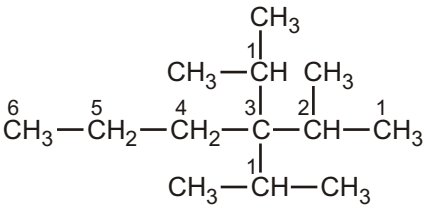
Solved Example



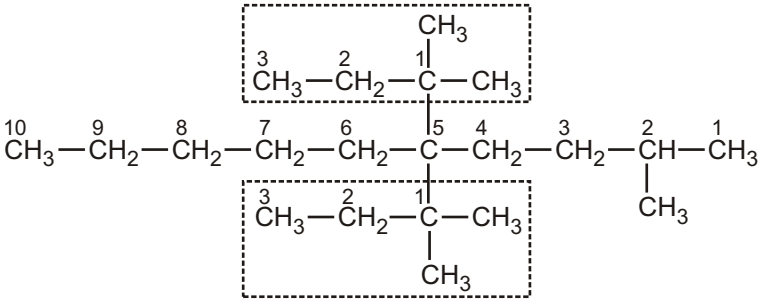
5-(1, 2-Dimethylpropyl)-6-ethyldecane

It may be noted here that the complete name of the complex substituent is dimethylbutyl. Since d of dimethylbutyl group comes first than e of the ethyl group in the alphabetical order, therefore, locant 5 is given to the complex substituent and 6 to the ethyl group.

(c) If the same complex substituent occurs more than once on the parent chain, prefixes bis (for two), tris (for three), tetrakis (for four), pentakis (for five) etc. are used before the name of the complex substituent. For example,



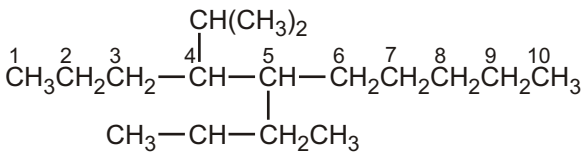
2-Methyl-3, 3-bis(1-methylethyl)hexane



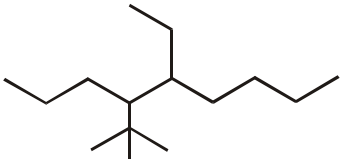
5, 5-Bis (1, 1-dimethylpropyl)-2-methyldecane

☞ Note that while deciding the alphabetical order of the various alkyl groups, **prefixes iso and neo are considered to be part of the fundamental name of the alkyl group while the prefixes sec, tert, di, tri are not.**

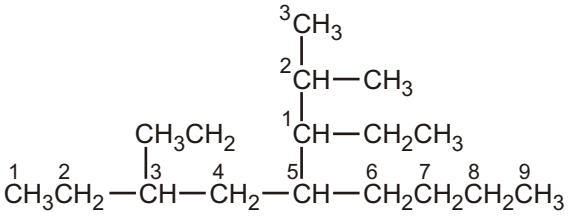
Solved Example



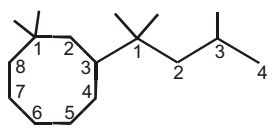
4-(Methylethyl)-5-(Methylpropyl)decane



4-(1,1-dimethylethyl)-5-ethylnonane
not 5-ethyl-4-(1,1-dimethylethyl) nonane



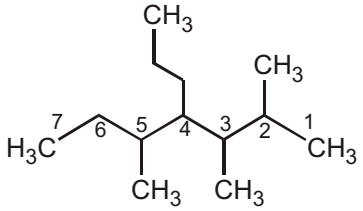
3-ethyl-5-(1-ethyl-2-methylpropyl)nonane



1,1 dimethyl-3-(1, 1,3-trimethylbutyl)cycloctane

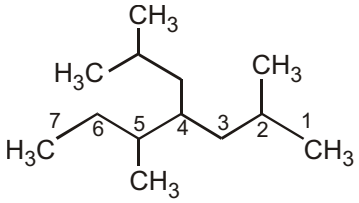
☞ If Chains of equal length are competing for selection as main chain in a saturated branched acyclic hydrocarbon, then the choice goes in series to :

(a) The chain which has the greatest number of side chains.



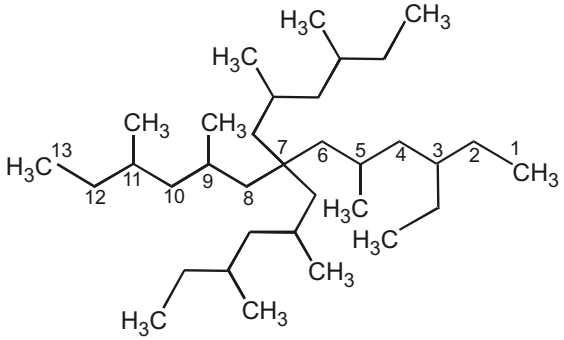
2,3,5-Trimethyl-4-propylheptane

(b) The chain whose side chains have the lowest-numbered locants.



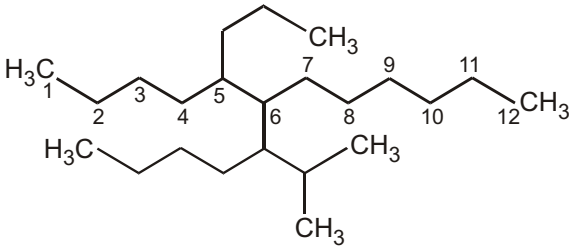
4-Isobutyl-2,5-dimethyl heptane

(c) The chain having the greatest number of carbon atoms in the smaller side chains.

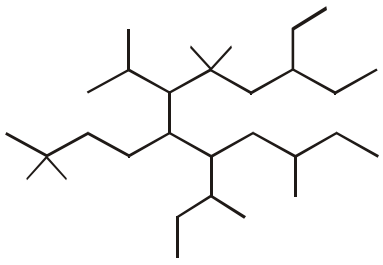


7,7,Bis(2,4-dimethylhexyl)-3-ethyl 5, 9, 11-trimethyl tridecane

(d) The chain having the least branched side chains.

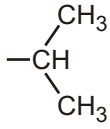
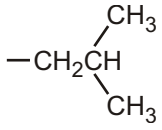
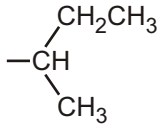
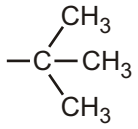
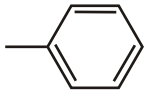
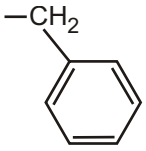
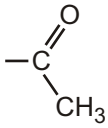
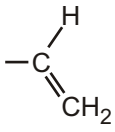
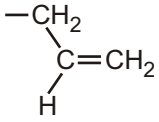


Name That Molecule !



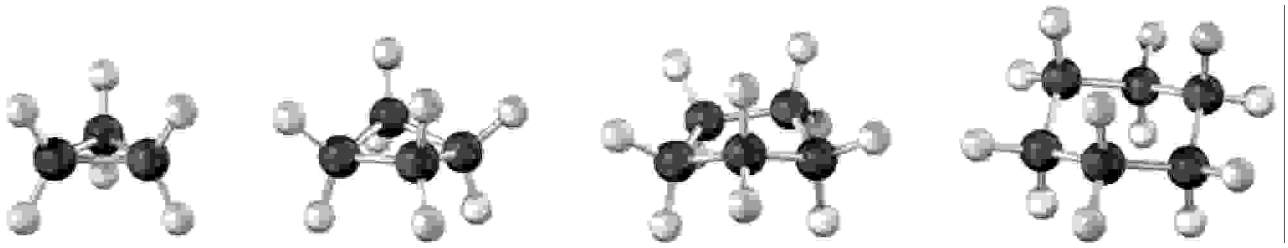
8-sec-butyl-3-ethyl-6-isopropyl-5,5, 10-trimethyl-7-neohexyldodecane
or
8-sec-butyl-7-(3, 3-dimethylbutyl)-3-ethyl-6-(1-methylethyl)-5,5,10-trimethyldodecane

COMMON NAMES AND STRUCTURAL ABBREVIATIONS

Group	Abbreviation	Structure
Alkyl	R	
Aryl	Ar	
Methyl	Me	$-CH_3$
Ethyl	Et	$-CH_2CH_3$
Propyl	Pr or n-Pr	$-CH_2CH_2CH_3$
Butyl	Bu or n-Bu	$-CH_2CH_2CH_2CH_3$
Isopropyl	i-Pr or ^{i}Pr	
Isobutyl	i-Bu or ^{i}Bu	
sec-Butyl	s-Bu or ^{s}Bu	
tert-Butyl	t-Bu or ^{t}Bu	
Phenyl	Ph	
Benzyl	Bn	
Acetyl	Ac	
Vinyl		
Allyl		
Halide	X	–F –Cl –Br –I

NOMENCLATURE OF CYCLIC ALKANE

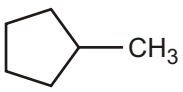
Saturated cyclic hydrocarbons are called cycloalkanes, or alicyclic compounds (aliphatic cyclic). Because cycloalkanes consist of rings of $–CH_2–$units, they have the general formula $(CH_2)_n$, or C_nH_{2n}, and can be represented by polygons in skeletal drawings.



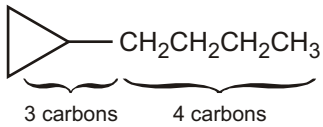
Cyclopropane Cyclobutane Cyclopentane Cyclohexane

Find the parent.

Count the number of carbon atoms in the ring and the number in the largest substituent. If the number of carbon atoms in the ring is equal to or greater than the number in the substituent, the compound is named as an alkyl-substituted cycloalkane. If the number of carbon atoms in the largest substituent is greater than the number in the ring, the compound is named as a cycloalkyl-substituted alkane. For example:

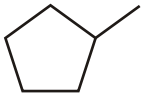


Methylcyclopentane

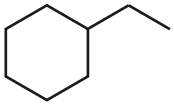


1-Cyclopropylbutane

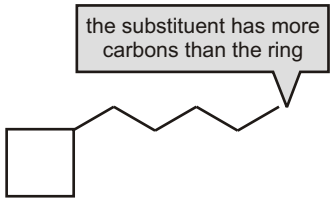
☞ In a cycloalkane with an attached alkyl substituent, the ring is the parent hydrocarbon unless the substituent has more carbons than the ring. In that case, the substituent is the parent hydrocarbon and the ring is named as a substituent. There is no need to number the position of a single substituent on a ring.



methylcyclopentane



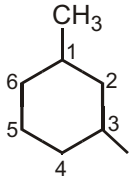
ethylcyclohexane



1-cyclobutylpentane

Number the substituents, and write the name.

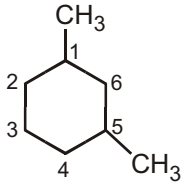
☞ For an alkyl- or halo-substituted cycloalkane, choose a point of attachment as carbon 1 and number the substituents on the ring so that the second substituent has as low a number as possible. If ambiguity still exists, number so that the third or fourth substituent has as low a number as possible, until a point of difference is found.



1,3-Dimethyl cyclohexane

Lower

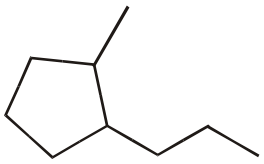
NOT



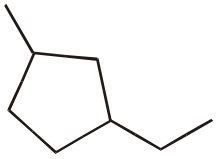
1,5-Dimethyl cyclohexane

Higher

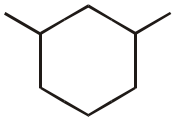
☞ If the ring has two different substituents, they are listed in alphabetical order and the number-1 position is given to the substituent listed first.



1-methyl-2-propylcyclopentane



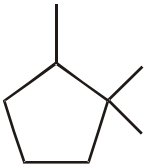
1-ethyl-3-methylcyclopentane



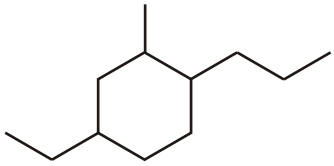
1,3-dimethylcyclohexane

☞ If there are more than two substituents on the ring, they are listed in alphabetical order, and the substituent given the number-1 position is the one that results in a second substituent getting as low a number as possible. If two substituents have the same low numbers, the ring is numbered—either clockwise or counterclockwise—in the direction that gives the third substituent the lowest possible number.

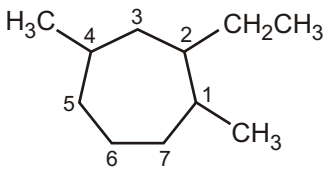
Solved Example



1,1,2-trimethylcyclopentane
not
1,2,2-trimethylcyclopentane
because 1 < 2
not
1,1,5-trimethylcyclopentane
because 2 < 5



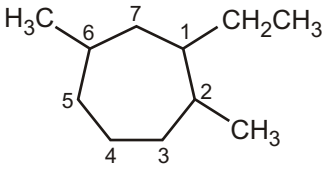
4-ethyl-2-methyl-1-propylcyclohexane
not
1-ethyl-3-methyl-4-propylcyclohexane
because 2 < 3
not
5-ethyl-1-methyl-2-propylcyclohexane
because 4 < 5



2-Ethyl-1,4-dimethyl cycloheptane

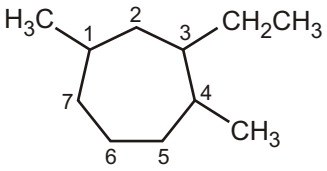
Lower Lower

NOT



1-Ethyl-2,6-dimethylcycloheptane

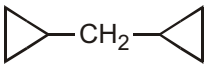
Higher



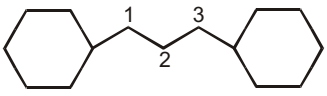
3-Ethyl-1,4-dimethylcycloheptane

Higher

☞ If more than one alicyclic ring is attached to a single chain, the compound is named as a derivative of alkane irrespective of the number of carbon atoms in the ring or the chain. For example,

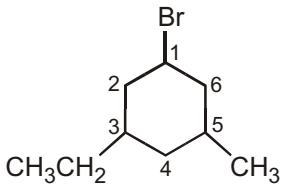


dicyclopropylmethane

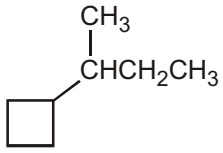


1,3-dicyclohexylpropane

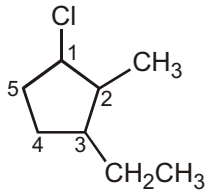
Solved Example



1-Bromo-3-ethyl-5-methyl cyclohexane



(1-Methylpropyl) cyclobutane or sec-butyl cyclobutane



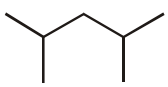
1-Chloro-3-ethyl-2-methyl-cyclopentane

Solved Problems

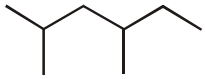
- Select the correct structure for the IUPAC names given below :

Part 1	Part 2	Part 3
4-methylheptane	2,4-dimethylhexane	2,3-dimethylpentane
Part 4	Part 5	Part 6
2,2-dimethylhexane	3-ethyl-1,1,2,2-tetramethylcyclopentane	3-ethyl-2-methylpentane
Part 7	Part 8	Part 9
2,5-dimethylhexane	1,1-dimethylcyclohexane	2,4,6-trimethylheptane

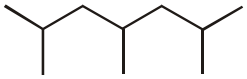
Structures:



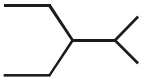
A



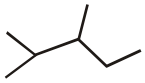
B



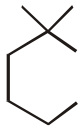
C



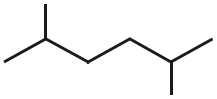
D



E



F



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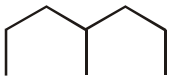

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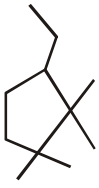

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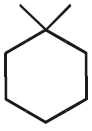

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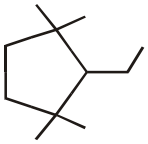


K

L

Sol. Part - 1 H Part - 2 B Part - 3 E Part - 4 F
Part - 5 I Part - 6 D Part - 7 G Part - 8 J
Part - 9 C

Solved Example

- Deduce structural formulas and give IUPAC names for the nine isomers of C_7H_{16}. (b) Why is 2-ethylpentane not among the nine ?

(a) seven-C chain

1. $CH_3CH_2CH_2CH_2CH_2CH_2CH_3$ — Heptane

six-C chain

2. $CH_3CH(CH_3)CH_2CH_2CH_2CH_3$ — 2-Methylhexane

3. $CH_3CH_2CH(CH_3)CH_2CH_2CH_3$ — 3-Methylhexane

five-C chain

4. $CH_3CH(CH_3)CH(CH_3)CH_2CH_3$ — 2,3-Dimethylpentane

5. $CH_3CH(CH_3)CH_2C(CH_3)CH_3z$ — 2,4-Dimethylpentane

6. $CH_3C(CH_3)_2CH_2CH_2CH_3$ — 2,2-Dimethylpentane

☑ SPECIAL TOPIC

OCTANE NUMBER

In addition to being volatile, gasoline must resist the potentially damaging explosive combustion known as knocking. The antiknock properties of gasoline are rated by an octane number that is assigned by comparing the gasoline to a mixture of *n*-heptane (which knocks badly) and isooctane (2,2,4-trimethylpentane, which is not prone to knocking). The gasoline being tested is used in a test engine with a variable compression ratio. Higher compression ratios induce knocking, so the compression ratio is increased until knocking begins. Tables are available that show the percentage of isooctane in an isooctane/heptane blend that begins to knock at any given compression ratio. The octane number assigned to the gasoline is simply the percentage of isooctane in an isooctane/heptane mixture that begins to knock at that same compression ratio.

$CH_3CH_2CH_2CH_2CH_2CH_2CH_3$

n-heptane (0 octane)
prone to knocking

$CH_3C(CH_3)_2CH_2CH(CH_3)CH_3$

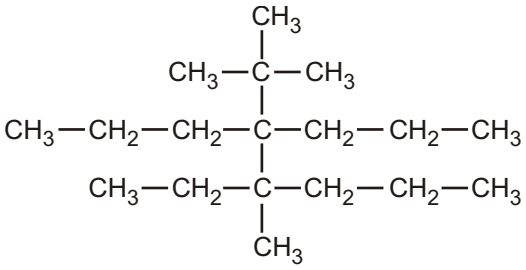
2,2,4-trimethylpentane (100 octane)
"isooctane," resists knocking

The octane number of a gasoline is determined by comparing its knocking with the knocking of mixtures of heptane and 2,2,4-trimethylpentane. The octane number given to the gasoline corresponds to the percent of 2,2,4-trimethylpentane in the matching mixture. Thus, a gasoline with an octane rating of 91 has the same “knocking” property as a mixture of 91% 2,2,4-trimethylpentane and 9% heptane. The term octane number originated from the fact that 2,2,4-trimethylpentane contains eight carbons. Because slightly different methods are used to determine the octane number, gasoline in Canada and the United States will have an octane number that is 4 to 5 points less than the same gasoline in Europe and Australia.

EXERCISE

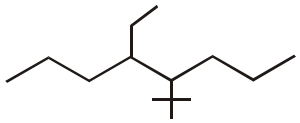
SINGLE CHOICE QUESTIONS

1. Total number of carbon atoms present in parent chain is :



(A) 5 (B) 6 (C) 7 (D) None of these

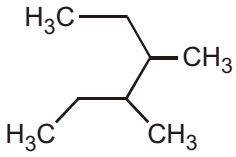
2. Correct IUPAC name of the following compound is :



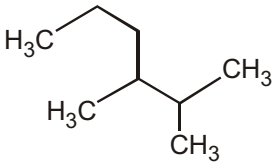
(A) 4-(1,1-dimethylethyl)-5-ethyloctane (B) 5-ethyl-4-(1,1-dimethylethyl)octane

(C) 5-(1,1-dimethylethyl)-4-ethyloctane (D) 5-ethyl-5-(1,1-dimethylethyl)octane

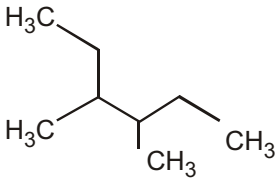
3. Among the following compounds



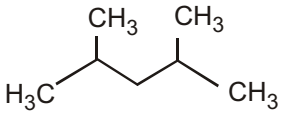
(i)



(ii)



(iii)

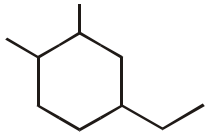


(iv)

2,3-dimethylhexane is :

(A) (i) (B) (ii) (C) (iii) (D) (iv)

4. What would be the best name for the following compound ? (Neglect any cis-trans isomerism that is possible.)



(A) 1-ethyl-3,4-dimethylcyclohexane (B) 3-ethyl-1,6-dimethylcyclohexane

(C) 1-ethyl-4,5-dimethylcyclohexane (D) 5-ethyl-1,2-dimethylcyclohexane

(E) 4-ethyl-1,2-dimethylcyclohexane

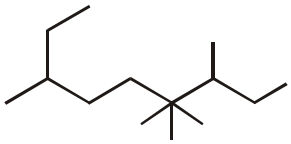
5. The correct IUPAC name of $CH_3CH_2CH(CH_3)CH(C_2H_5)_2$ is :

(A) 4-ethyl - 3-methyl hexane (B) 3-ethyl - 4 methyl hexane

(C) 4-methyl - 3-ethyl hexane (D) 2, 4-diethylpentane

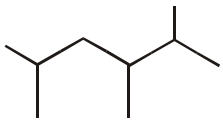
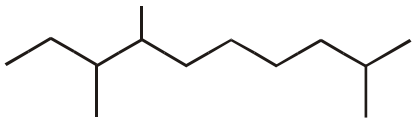
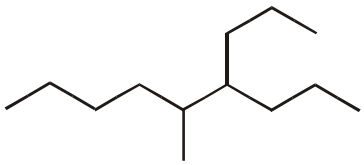
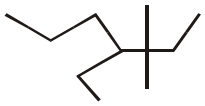
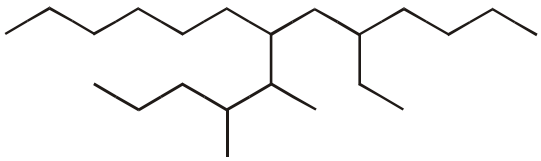
6. What is the parent name for the following alkane ?

(**Note :** The parent name corresponds to the longest continuous chain of carbon atoms.)



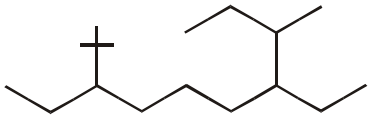
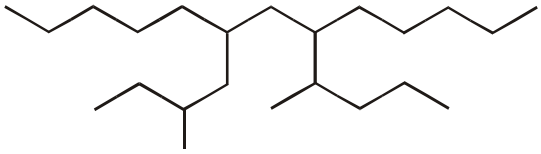
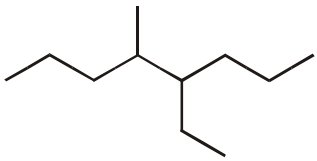
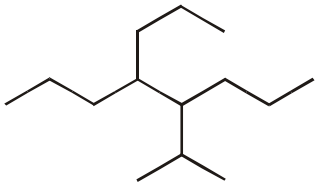
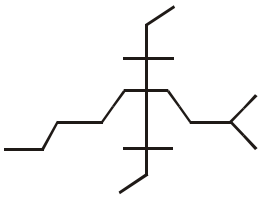
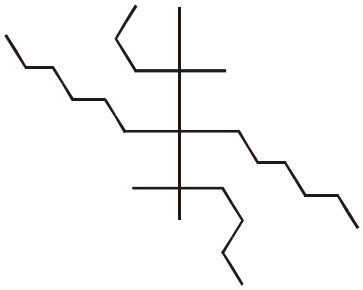
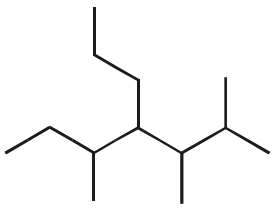
(A) Heptane (B) Octane (C) Nonane (D) Decane

WORK SHEET - 1

S.N.	Compound	Number of carbon atom in Parent chain
1.		
2.		
3.		
4.		
5.	$CH_3CH_2CH_2\underset{\displaystyle CH_2CH_3}{\underset{\vert}{C}}H-CH(CH_3)_2$	
6.	$CH_3-\underset{\displaystyle CH_3}{\underset{\vert}{C}}H-CH_2-\underset{\displaystyle CH_2CH_3}{\underset{\vert}{C}}H-CH_3$	
7.	$CH_3-CH_2-\underset{\displaystyle CH_3CH_2}{\underset{\vert}{C}}H-\underset{\displaystyle CH_2CH(CH_3)_2}{\underset{\vert}{C}}H-CH_2-CH_2-CH_3$	
8.		
9.	$CH_3CH_2\underset{\displaystyle C(CH_3)_3}{\underset{\vert}{C}}H\underset{\displaystyle CH(CH_3)_2}{\underset{\vert}{C}}HCH_3$	
10.	$(CH_3)_3C-\underset{\displaystyle CH_3-CHCH_2CH_3}{\underset{\vert}{C}}H-CH_2CH_2CH_3$	

11. $CH_3C(CH_3)_2CH(CH_2CH_3)CH_2CH_2CH(CH_3)_2$

WORK SHEET - 2

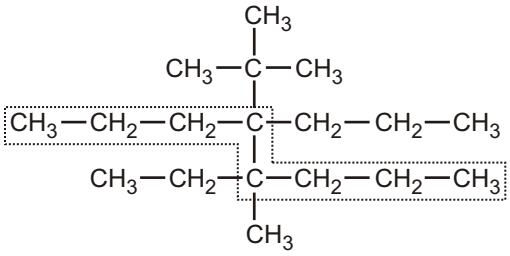
S.N.	Compound	Write IUPAC - Name
1.		
2.		
3.		
4.		
5.		
6.		
7.		

Answer

1. (D) **2.** (A) **3.** (B) **4.** (E) **5.** (B) **6.** (C)

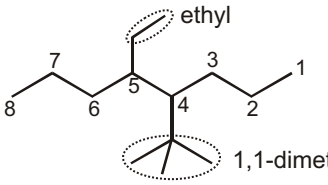
Single Choice Questions

1.



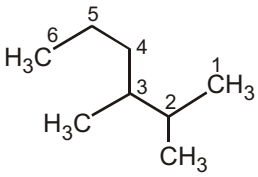
8 Carbons in parent chain

2.



4-(1,1-dimethylethyl)-5-ethyloctane

3.



2, 3-Dimethyl hexane

Work Sheet - 1

1. 6 **2.** 10 **3.** 9 **4.** 7 **5.** 6 **6.** 6 **7.** 7 **8.** 13

9. 6 **10.** 7 **11.** 7

Work Sheet - 2

1. 3, 7-Diethyl - 2, 2,8-trimethyl decane

2. 6-(1-methylbutyl) - 8-(2-methylbutyl) tridecane

3. 4-ethyl - 5 - methyl octane

4. 4-(1-methyl ethyl) - 5-propyl octane **or** 4-isopropyl-5-propyl octane

5. 5, 5-Bis (1, 1-dimethyl propyl)-2-methyl- decane

6. 7-(1,1-dimethyl butyl)-7-(1,1-dimethyl pentyl) tridecane

7. 2, 3, 5-trimethyl - 4-propyl heptane

❑❑❑