ORGANIC CHEMISTRY

NOMENCLATURE: NAMING ORGANIC COMPOUNDS

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CHEMISTRY 165B | SPRING 2019

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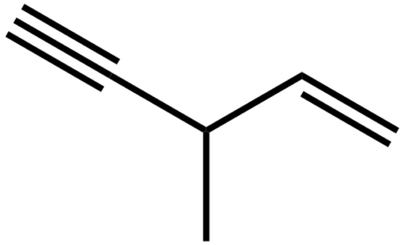
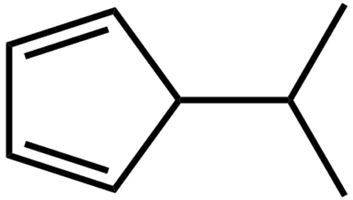
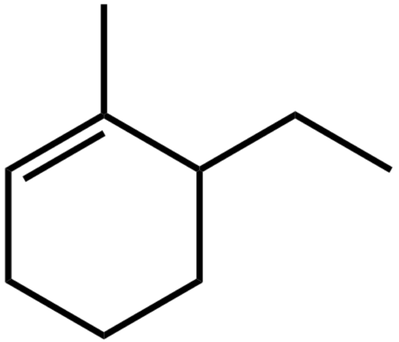
PRACTICE PROBLEM 1

Give the chemical formula (C_XH_Y) for each of the following organic compounds drawn.

– answer –







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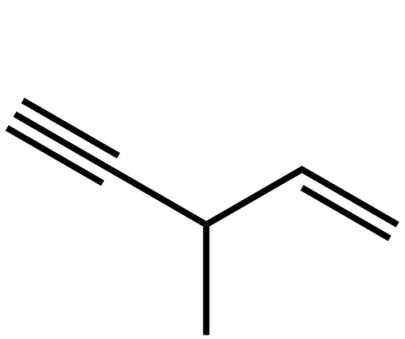
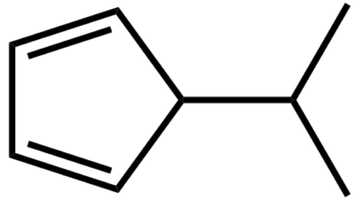
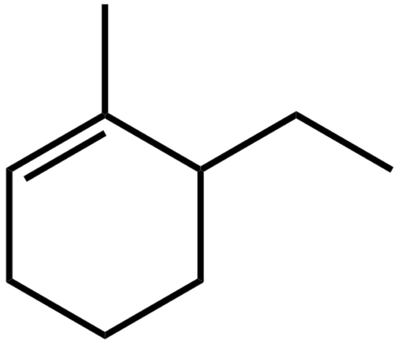
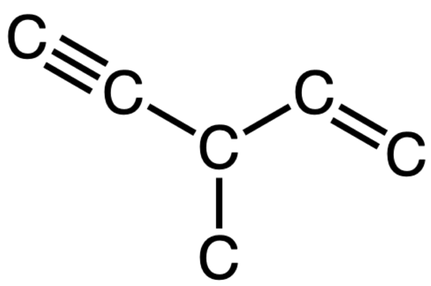
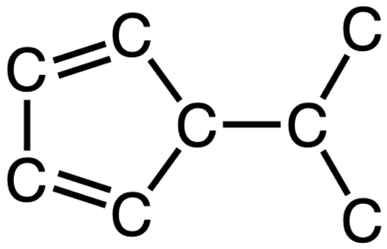
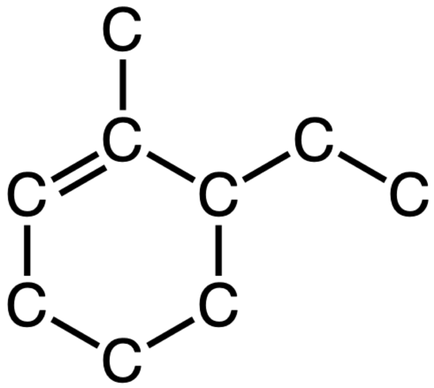












C_6H_8

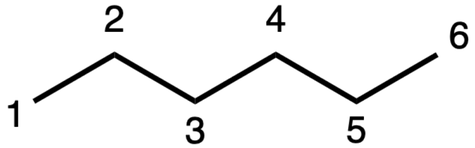
C_8H_{12}

C_9H_{16}

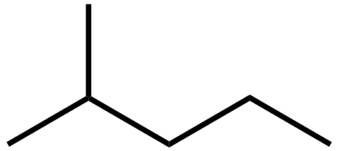
How to name alkanes (Part 1)

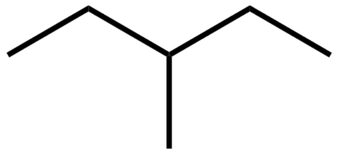
Let us start with a simple exercise: C_6H_{14}

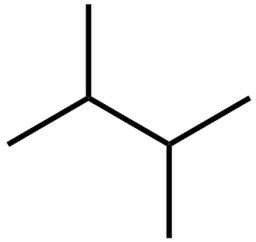
Try to name the following compounds following the rules!

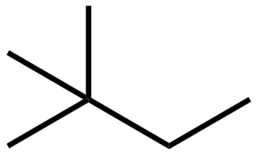


hexane









NAMING CONVENTIONS

1. Identify and name the longest carbon chain. *See red roots.*
2. Identify and name the substituents attached to this chain. *See blue names.*
3. Number the longest carbon chain some side nearest to a substituent. *See red numbers.*

   If more than one type of substituent, then start on the side nearest to the first cited/alphabetized substituent.
4. Label the location(s) of each substituent(s) by the number of the carbon atom to which it is attached.
5. List the groups in alphabetical order by the roots.

   If more than one substituent, then use prefixes:

   "di-" "tri-" "tetra-" "penta-" …

   but do not alphabetize using the prefix; use the root!

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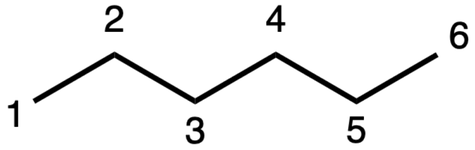
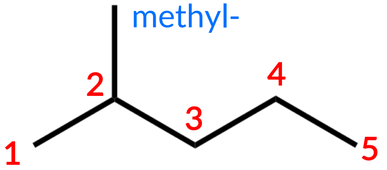
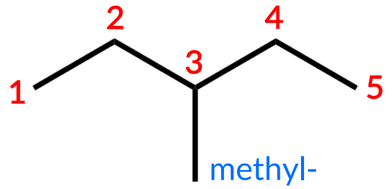


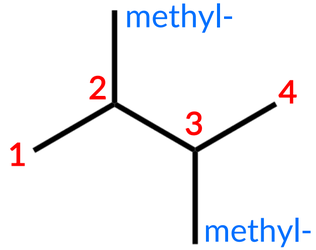
hexane



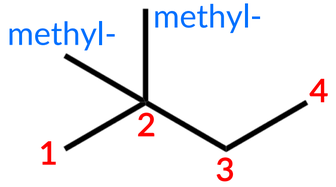
2-methylpentane



3-methylpentane



2,3-dimethylbutane



2,2-dimethylbutane

How to name alkanes (Part 2)

Let us move to a more complex exercise: $C_6H_{14}Br_2Cl$

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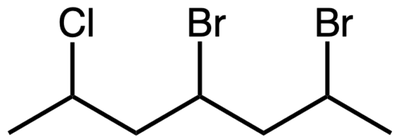

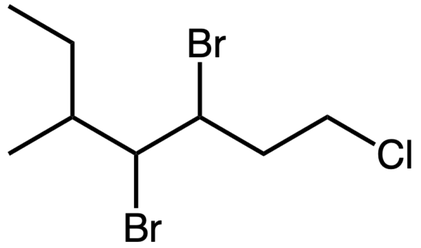

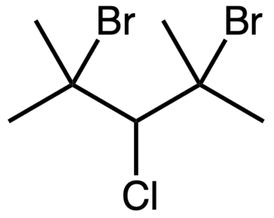

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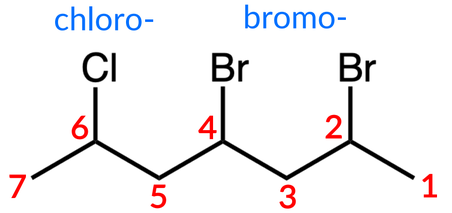
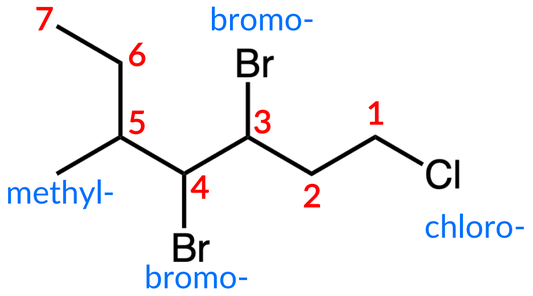
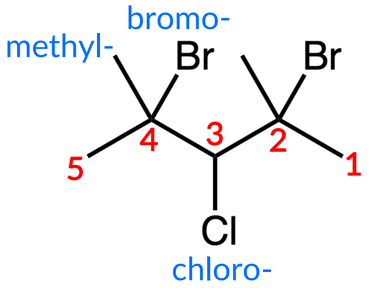


2,4-dibromo-6-chloroheptane



3,4-dibromo-1-chloro-5-methylheptane



2,4-dibromo-3-chloro-2,4-dimethylpentane

PRACTICE PROBLEM 2

Match each of the following names to the structures (A–L) drawn.

— answer —

4-methylheptane

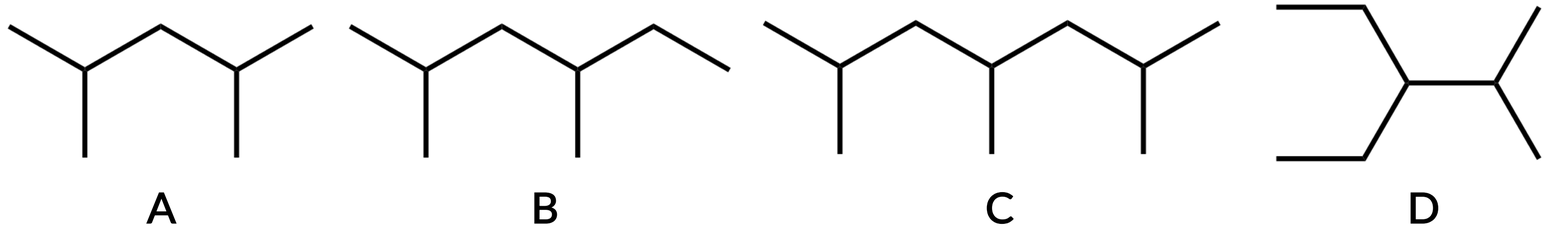
2,4-dimethylhexane

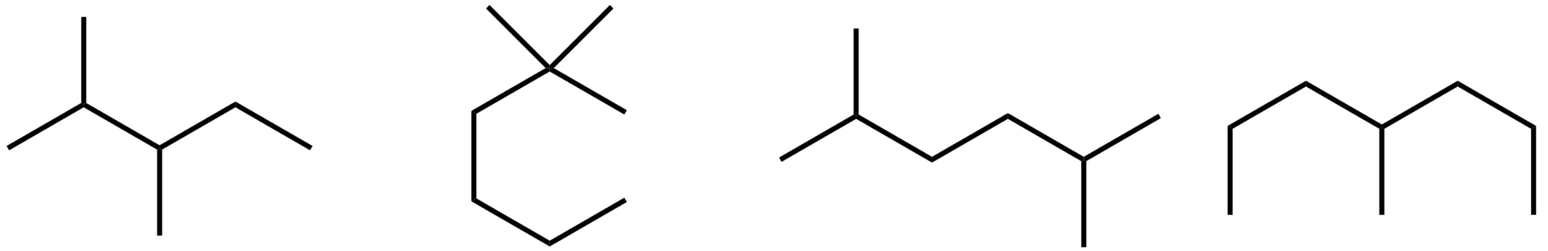
2,2-dimethylhexane

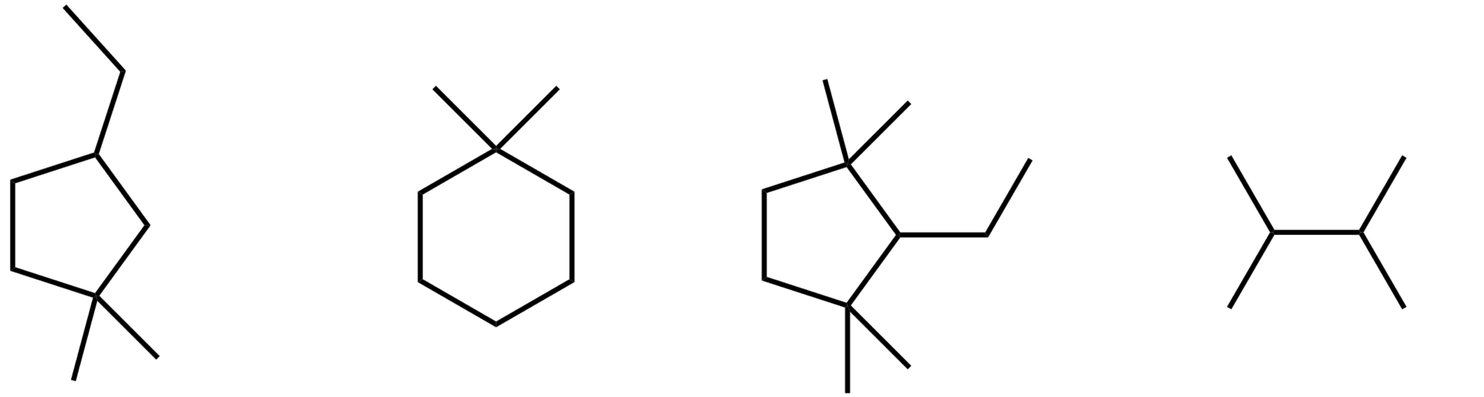
2,3-dimethylpentane

1,1-dimethylcyclohexane

1-ethyl-3,3-dimethylcyclopentane







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Match each of the following names to the structures (A–L) drawn.

— answer —

4-methylheptane **(H)**

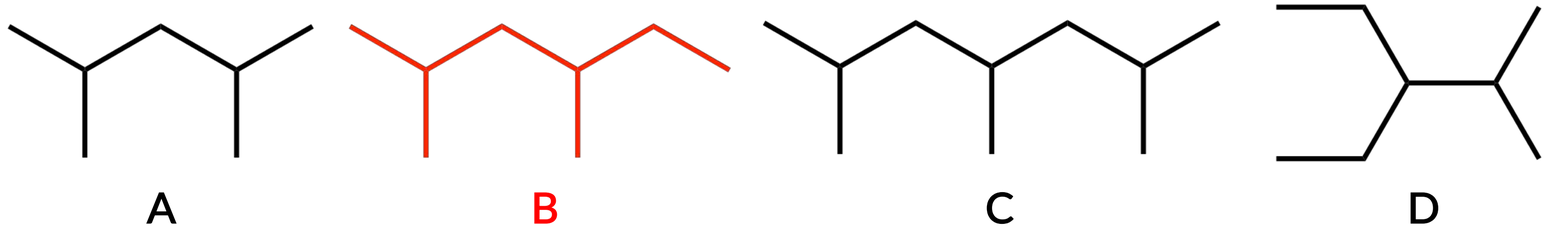
2,4-dimethylhexane **(B)**

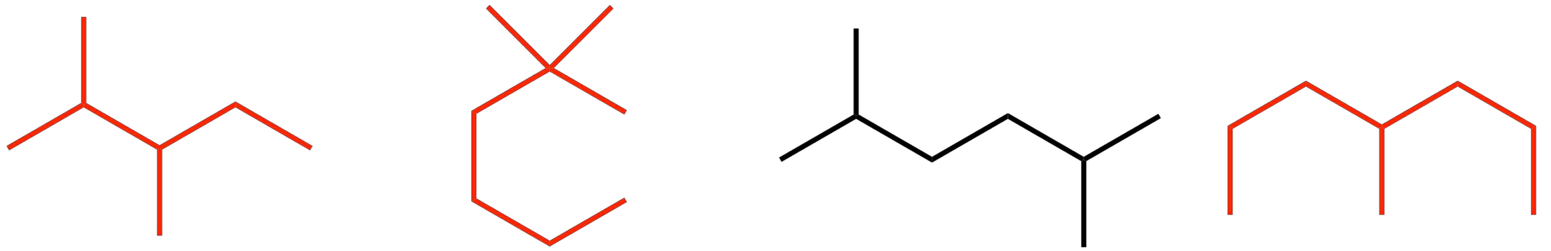
2,2-dimethylhexane **(F)**

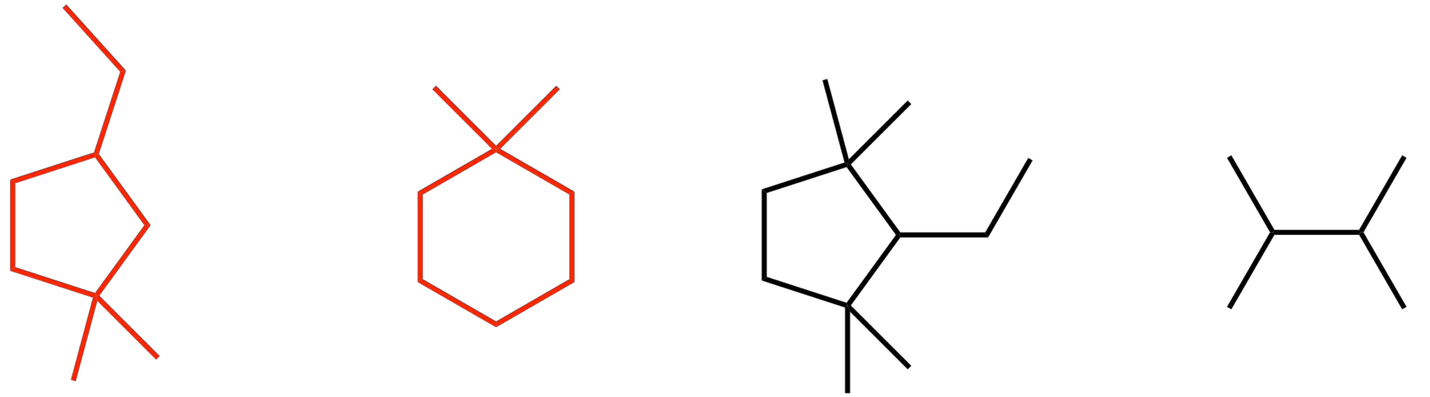
2,3-dimethylpentane **(E)**

1,1-dimethylcyclohexane **(J)**

1-ethyl-3,3-dimethylcyclopentane **(I)**







How to name alkenes (& alkynes)

NAMING CONVENTIONS

1. Identify and name the longest carbon chain. *See red roots.*

   This chain must include both carbons on the double bond

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   If the double bond is in the middle, start from end nearest a substituent. If more than one type of substituent, then start on the side nearest to the first cited/alphabetized substituent.

4. Label the location(s) of each substituent(s) by the number of the carbon atom to which it is attached.
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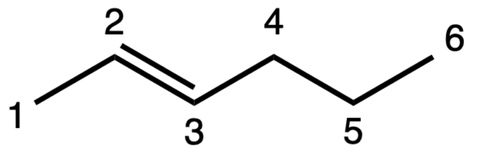
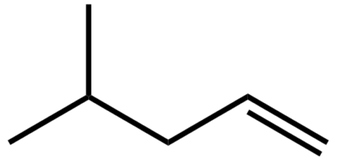
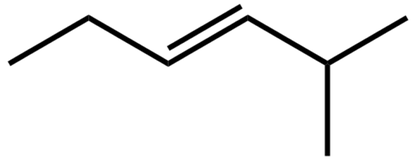
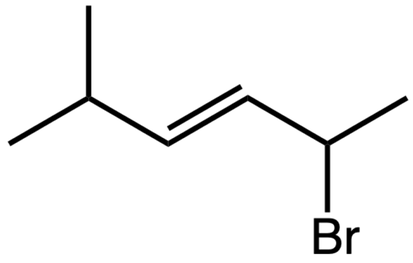


2-hexene
(hex-2-ene)







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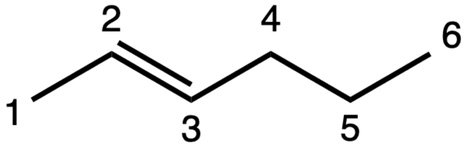
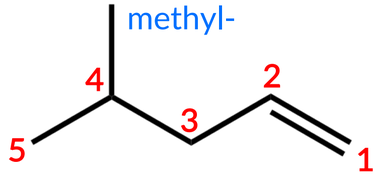
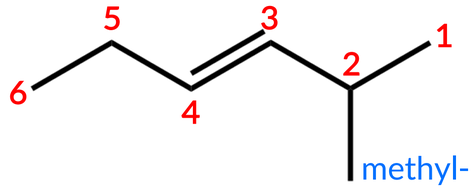


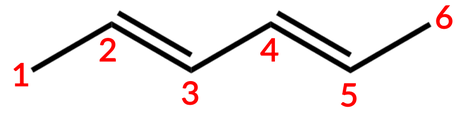
2-hexene
(hex-2-ene)



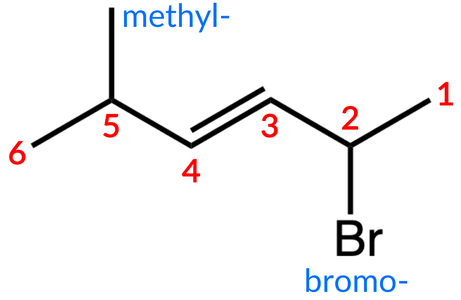
4-methyl-1-pentene
(4-methylpent-1-ene)



2-methyl-3-hexene
(2-methylhex-3-ene)



2,4-hexadiene
hexa-2,4-diene



2-bromo-5-methyl-3-hexene
2-bromo-5-methylhex-3-ene

PRACTICE PROBLEM 3

Draw the structures based on the following chemical names. Ignore *cis*/*trans* isomerism.

– answer –

1-chloro-5,5-dimethylhept-3-yne

6-methylhept-3-ene

3,4-dichlorocyclopent-1-ene

2-chloro-4-methylhexa-2,4-diene

3,3-diethyl-1-iodopentane

4-methylpent-2-yne

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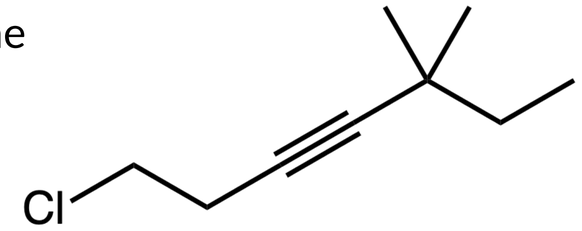
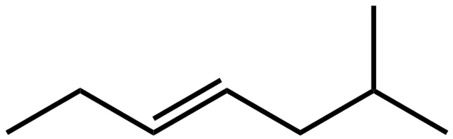
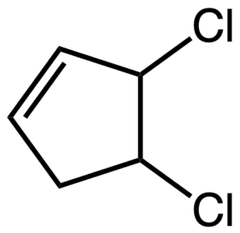


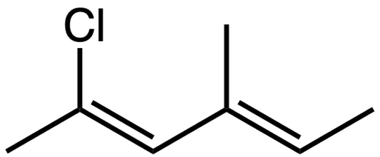
6-methylhept-3-ene



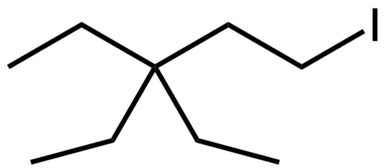
3,4-dichlorocyclopent-1-ene



2-chloro-4-methylhexa-2,4-diene



3,3-diethyl-1-iodopentane



4-methylpent-2-yne