Alkane Nomenclature

3-1 Draw the structure for each of the following compounds

(a) sec-butylcyclohexane

(b) 2,2,7-trimethyloctane

(c) 3-ethyl-2,4,5-trimethylhexane

(d) 1-cyclopropylbutane

(e) 3-ethyl-2,5-dimethyl-4-propylheptane

(f) 1-tert-butyl-4-iodocyclohexane

(g) trans-1,4-diisopropylcyclohexane

(h) 3-bromo-1-cyclopropyl-2-methylbutane

(i) Z-1,2-dichloro-1-methylcyclopentane

(j) 1-chloro-3-ethyl-3-methylhexane

(k) Norbornane (Bicyclo[2.2.1]heptane)

(l) 1-[2-(bromomethyl)cyclopropyl]-4-tert-butylcyclohexane

3-2 Give the IUPAC names of the following alkanes.

(a) \((\text{CH}_3)_2\text{CHCH}_2\text{CH}_2\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3\)

(b)

\[
\begin{array}{c}
\text{H}_3\text{C} \\
\text{CH}_2 \\
\text{CH}_2 \\
\text{CH}_2 \\
\text{CH}_2 \\
\text{CH}_3
\end{array}
\]

(c)
3-3 The following names are incorrect or incomplete, but they represent the real structures. Draw each structures and name it correctly.

(a) 2-ethyl-3-methylhexane

(b) 2-isopropylpentane

(c) 2-bromo-5-isopropylheptane

(d) 4-ethyl-3-isopropylheptane

(e) 2,4-trimethylpentane

(f) 1-chloro-2-ethyl-5-methylcyclohexane

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Alkyl Halide Nomenclature

3-4 Draw the structures of these following compounds

a) 2-chlorohexane

b) 1-bromo-2-chlorocyclopentane

c) Isobutyl chloride

d) 5-chloro-2,3-dimethylhexane

e) (2S) 2-bromohexane

3-5 Give IUPAC names to the following compounds

a)

[Diagram]

b)
3-6 Classify each of the following compounds as primary, secondary, or tertiary alkyl halides

a)  

b)  

c)  

d)  

Alkene Nomenclature

3-7 Give the IUPAC name for the following alkene structures.
3-8 Give the structures of the following compounds.

a) [1,1′-bi(cyclohexan)]-1-ene
b) 2,3-dimethylbut-2-ene
c) (4E)-4-ethylidene-2-methylhept-1-ene
d) [(1E,3E)-hexa-1,3-dien-1-yl]cyclopentane

3-9 State whether the following compounds are Z, E, or neither.

3-10 Give the IUPAC name for the following structures.

3-11 Draw the bond-line for these following compounds:

a) 3-hexyne
b) 2-bromo-5-octyne
c) 3,3-dimethyl-6-decyne
d) Cyclopentylacetylene
e) 2-chloronon-4-en-6-yne

f) 2,4-heptadiyne

3-12 Give IUPAC names for the following compounds

a)

\[Cl - C_3 - C = C - C_2 - C\]

b)

\[C_6 - C = C - C_2 - C\]

c)

\[C_6 - C_2 - C = C - C\]

d)

\[Cl - C_3 - C\]

\[Br - C_2 - C - C = C\]

Alcohol and Phenol Nomenclature

3-13 Classify each alcohol as primary, secondary, or tertiary.

(a) 3-11

(b) 3-11

(c) 3-11

(d) 3-11

3-14 Give a systematic (IUPAC) name for each alcohol.

(a) 3-11

(b) 3-11

(c) 3-11

(d) 3-11

3-15 Draw the structures of the following compounds.

a) 2-methylhexan-1-ol

b) 2-methylpentan-2-ol

c) 2-chlorophenol
d) 4-(chloromethyl)hexan-1-ol

e) cyclopent-2-en-1-ol

f) 3-bromo-2-(2-bromoethyl)pentan-1-ol

3-16 Give a systematic (IUPAC) name for each phenol.

(a) \[\text{O}^{\text{N}}\text{O}^{\text{H}}\]

(b) \[\text{O}^{\text{H}}\]

(c) \[\text{O}^{\text{SO}}\text{OH}\]

Ethers

3-17 Give the IUPAC name for the following chemical structures.

a) 

b) 

c) 

d) 

e) 

f) 

g) 

(h) 

(i)
3-18 Draw structures of the following.

(a) 3-isopropoxypentane  (b) 1-(4-chlorophenoxy)-3-methylbenzene  (c) 2-(tert-butoxy)-2-methylpropane

3-19 Name the following ethers and sulfides.

(a)

(b)

(c)

(d)

(e)
Benzene and its Derivatives

3-20 State whether the following is para, meta, or ortho substituted.

![Chemical structures](image)

A) 
B) 
C) 

3-21 Name the following compounds.

![Chemical structures](image)

A) 
B) 
C) 
D) 

3-22 Draw the following structures

a. p-chloriodobenzene
b. m-bromotoluene
c. p-chloroaniline
d. 1,3,5-trimethylbenzene

3-23 Give the IUPAC name for the following benzene derivatives.
3-24 Draw the following molecules given by their IUPAC nomenclature.

1. 5-formyl-2-hydroxybenzoic acid
2. 1,2-diethyl-3-fluorobenzene
3. 4-amino-3-ethyl-5-methylphenol

3-25 Rank the functional groups on the following molecule in order of priority (highest to lowest).

Aldehydes and Ketones

3-26 For the following molecules, give the IUPAC nomenclature.
Amines

3-27 Draw the structures given by the following IUPAC names.

1. 4-methylpentan-2-amine
2. N-ethyl-N-methylpropan-1-amine
3. 6-aminocyclohex-1-ene-1-carboxylic acid
4. (dimethylamino)acetonitrile

Carboxylic Acids

3-28 Give the correct IUPAC nomenclature for the following compounds.

a) b) c) d) e) f)

Carboxylic Acid Derivatives

3-29 Name the following compounds using IUPAC conventions

(a)

(b)