Alcohols

Table of Contents

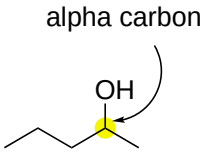
Summary

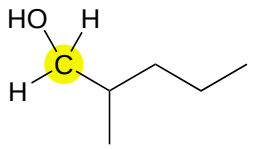
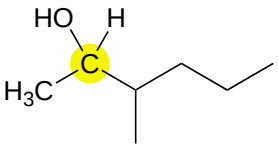
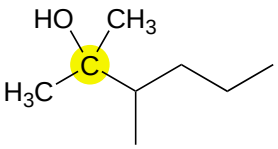
Functional Group	General Formula	Structure	Prefix	Suffix
Alcohol	-OH	R—OH	hydroxy-	-ol

Primary, Secondary and Tertiary Alcohols

Alcohols can be classified as primary, secondary or tertiary alcohols. This classification relies on the **alpha carbon** and the number of hydrogen atoms bonded directly to the alpha carbon. There are no special naming conventions that need to be learned for primary, secondary or tertiary alcohols.

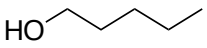
Recall that the **alpha carbon** is the one attached to the alcohol functional group.



Configuration	Description	Example
Primary alcohol	The **alpha carbon** has two or more hydrogen atoms bonded directly to it.	
Secondary alcohol	The **alpha carbon** has one hydrogen atom bonded directly to it.	
Tertiary alcohol	The **alpha carbon** has no hydrogen atoms bonded directly to it.	

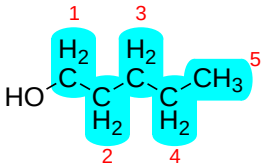
Worked Examples

Pentan-1-ol



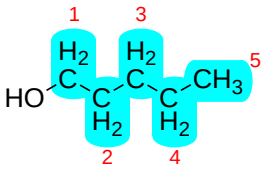
STEP 1: Identify the parent hydrocarbon chain

1.1 It should have the functional group with the highest priority
1.2 It should have the maximum length



- Functional group ✓
- Longest chain ✓

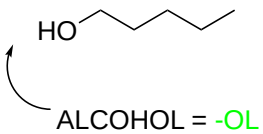
STEP 2: Count the number of carbons in the parent hydrocarbon chain and identify the appropriate prefix. If the parent chain is an alkane, add the -an suffix.



5 C = PENT-

ALKANE = -AN-

STEP 3: Identify the functional group with the highest priority and its suffix



STEP 4: Identify side chains. Count the number of carbons and identify their prefix and suffix

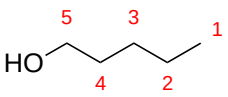
None

STEP 5: Identify any remaining functional groups (including double and triple bonds) and their suffixes

None

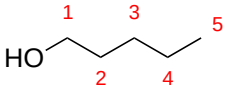
STEP 6: Number the parent hydrocarbon chain from the end that produces the lowest set of locants for, in order of precedence, functional groups, double and triple bonds and side chains

Option 1



Alcohol = 5

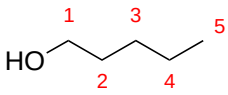
Option 2



Alcohol = 1

Lowest locants possible

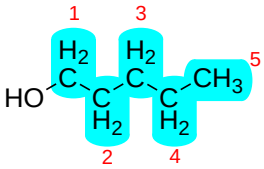
STEP 7: Numbers indicating the locant of the functional group are placed directly before the functional group portion of the name.



Alcohol = -1-OL

STEP 8: Write the complete name

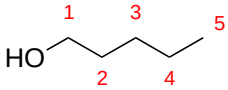
8.1 Commas are written between numbers
8.2 Hyphens are written between numbers and letters
8.3 Successive words are combined into one word



5 C = PENT-

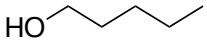
ALKANE = -AN-

Steps 1,2



Alcohol = -1-OL

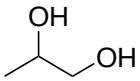
Steps 3,6,7



pentan-1-ol

Step 8

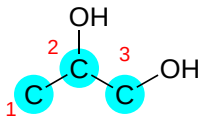
Propan-1,2-diol



STEP 1: Identify the parent hydrocarbon chain

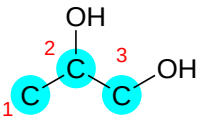
1.1 It should have the functional group with the highest priority
1.2 It should have the maximum length

Option 1



- Functional group ✓
- Longest chain ✓

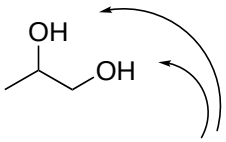
STEP 2: Count the number of carbons in the parent hydrocarbon chain and identify the appropriate prefix. If the parent chain is an alkane, add the -an suffix.



3 C = PROP-

ALKANE = -AN-

STEP 3: Identify the functional group with the highest priority and its suffix



ALCOHOL = -OL

2x alcohol = -DIOL

STEP 4: Identify side chains. Count the number of carbons and identify their prefix and suffix

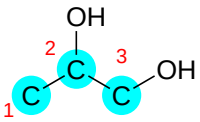
None

STEP 5: Identify any remaining functional groups (including double and triple bonds) and their suffixes

None

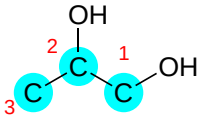
STEP 6: Number the parent hydrocarbon chain from the end that produces the lowest set of locants for, in order of precedence, functional groups, double and triple bonds and side chains

Option 1



Alcohol = 2,3

Option 2



Alcohol = 1,2

Lowest locants possible

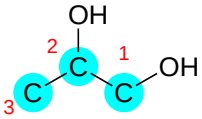
STEP 7: Numbers indicating the locant of the functional group are placed directly before the functional group portion of the name.

7.1 Names are listed alphabetically

7.2 If there is more than one of the same functional group, the prefix di- (2), tri- (3), tetra- (4) are used. These are not considered for alphabetical listing

7.3 If the functional group is in a position where no alternative position is possible, no number is required (e.g. ethan-1-ol should be written as ethanol)

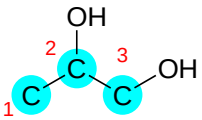
Option 2



Alcohol = -1,2-DIOL

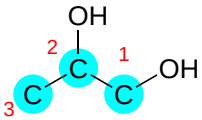
STEP 8: Write the complete name

8.1 Commas are written between numbers
8.2 Hyphens are written between numbers and letters
8.3 Successive words are combined into one word



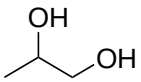
2C = PROP-
ALKANE = -AN-

Steps 1,2



Alcohol = -1,2-DIOL

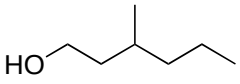
Steps 3,6,7



propan-1,2-diol

Step 8

3-methylhexan-1-ol



STEP 1: Identify the parent hydrocarbon chain

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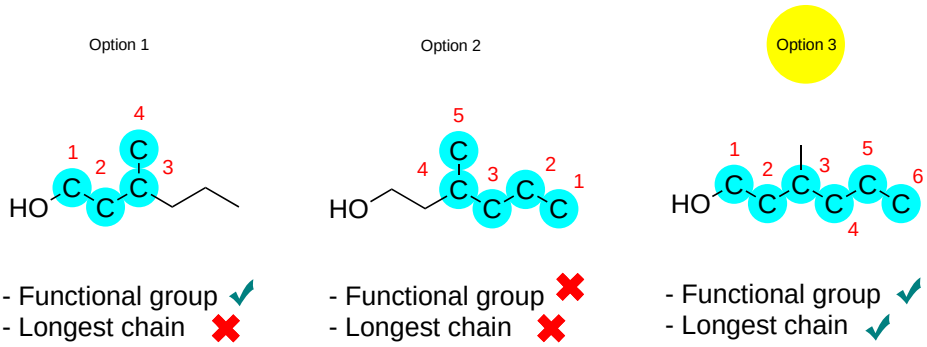
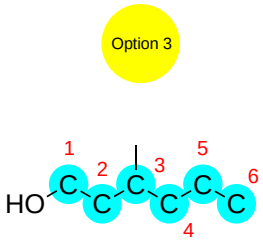


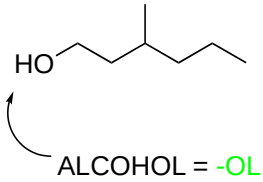
STEP 2: Count the number of carbons in the parent hydrocarbon chain and identify the appropriate prefix. If the parent chain is an alkane, add the -an suffix.



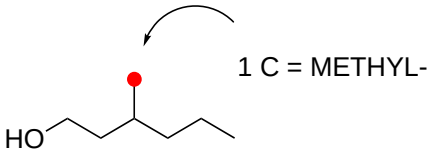
6C = HEX-

ALKANE = -AN-

STEP 3: Identify the functional group with the highest priority and its suffix



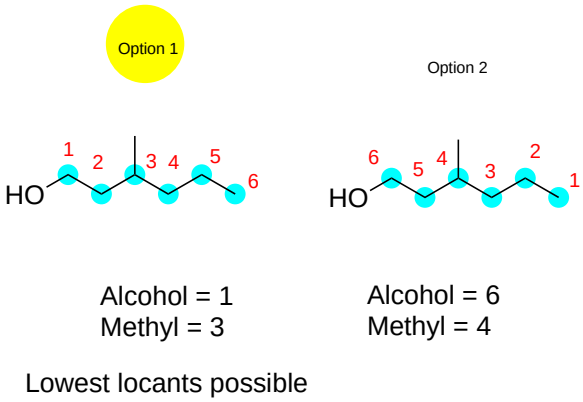
STEP 4: Identify side chains. Count the number of carbons and identify their prefix and suffix



STEP 5: Identify any remaining functional groups (including double and triple bonds) and their suffixes

None

STEP 6: Number the parent hydrocarbon chain from the end that produces the lowest set of locants for, in order of precedence, functional groups, double and triple bonds and side chains



STEP 7: Numbers indicating the locant of the functional group are placed directly before the functional group portion of the name.

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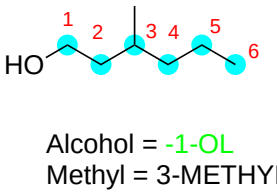

STEP 8: Write the complete name

8.1 Commas are written between numbers
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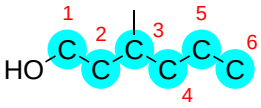
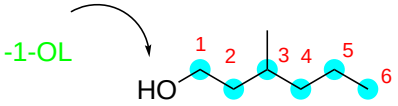
8.3 Successive words are combined into one word



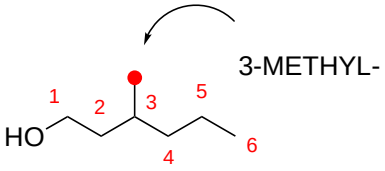
6C = HEX-

ALKANE = -AN-

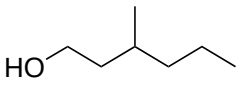
Steps 1,2



Steps 3,6,7



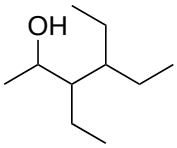
Steps 4,6,7



3-methylhexan-1-ol

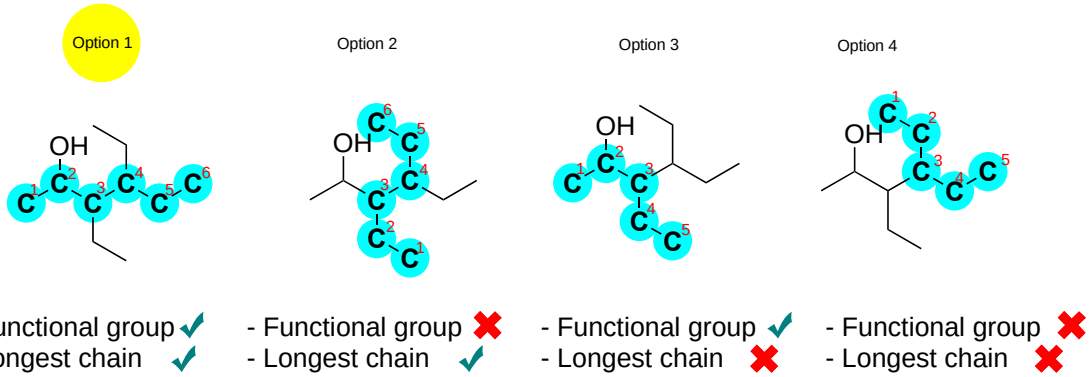
Step 8

3,4-diethylhexan-2-ol

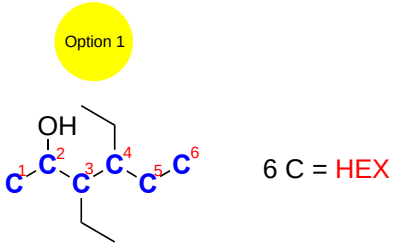


STEP 1: Identify the parent hydrocarbon chain

1.1 It should have the functional group with the highest priority
1.2 It should have the maximum length

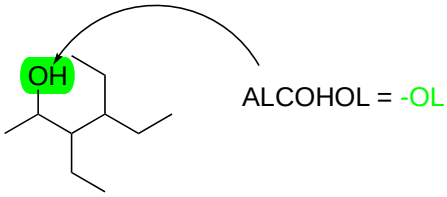


STEP 2: Count the number of carbons in the parent hydrocarbon chain and identify the appropriate prefix. If the parent chain is an alkane, add the -an suffix.

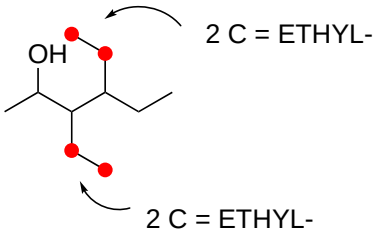


ALKANE = -AN-

STEP 3: Identify the functional group with the highest priority and its suffix



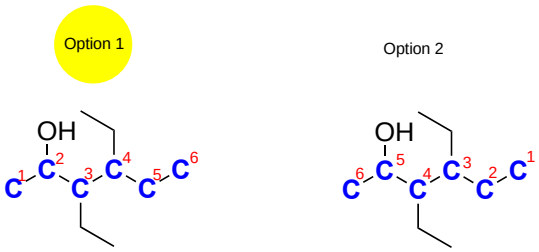
STEP 4: Identify side chains. Count the number of carbons and identify their prefix and suffix



STEP 5: Identify any remaining functional groups (including double and triple bonds) and their suffixes

None

STEP 6: Number the parent hydrocarbon chain from the end that produces the lowest set of locants for, in order of precedence, functional groups, double and triple bonds and side chains



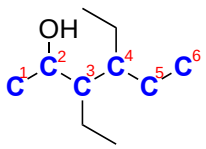
Alcohol = 2
Ethyl = 3
Ethyl = 4

Alcohol = 6
Ethyl = 4
Ethyl = 3

Lowest locants possible

STEP 7: Numbers indicating the locant of the functional group are placed directly before the functional group portion of the name.

7.1 Names are listed alphabetically
7.2 If there is more than one of the same functional group, the prefix di- (2), tri- (3), tetra- (4) are used. These are not considered for alphabetical listing

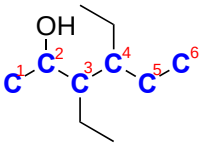


Alcohol = -2-OL
Ethyl = 3,4-DIETHYL

Combine the two ethyl = diethyl

STEP 8: Write the complete name

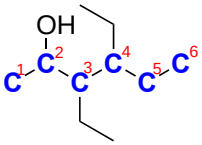
8.1 Commas are written between numbers
8.2 Hyphens are written between numbers and letters
8.3 Successive words are combined into one word



6 C = HEX

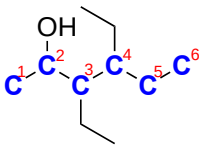
ALKANE = -AN-

Steps 1,2



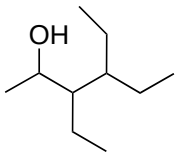
Alcohol = -2-OL

Steps 3,6,7



Ethyl = 3,4-DIETHYL

Steps 4,6,7



3,4-diethylhexan-2-ol

Step 8