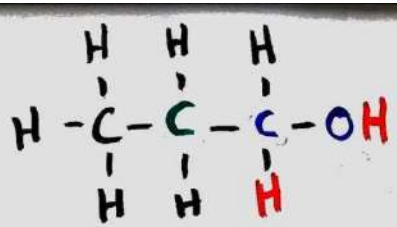
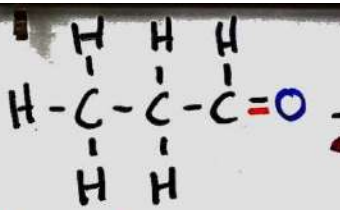
Alcohols and Phenols

1° alcohol (primary)

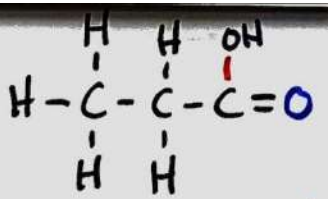


[O] ⇌ [R]



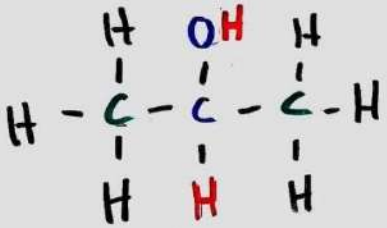
aldehyde

[O] ⇌ [R]

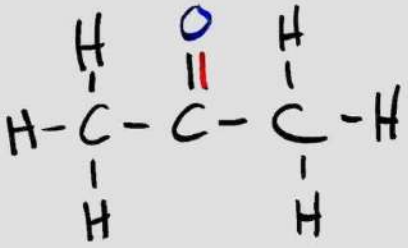


carboxylic acid

2° alcohol (Secondary)

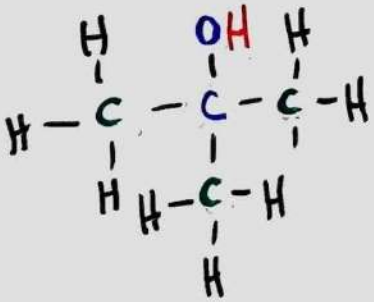


[O] ⇌ [R]



Ketone

3° alcohol (Tertiary)



[O] → N.R.

"C" = the alcohol carbon

"C" = a carbon attached to the alcohol carbon.

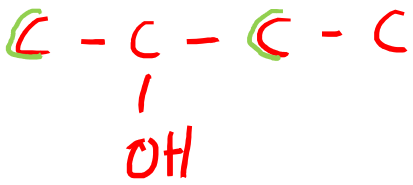
Alcohols

Alcohols are classified by the number of R groups *(i.e. carbon atoms)* attached to the hydroxyl carbon as shown here. Classification

primary (1°)

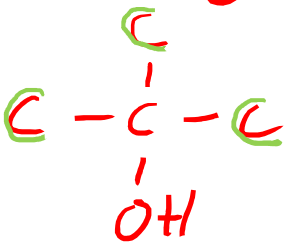
(OH is on the end)

Secondary (2°)

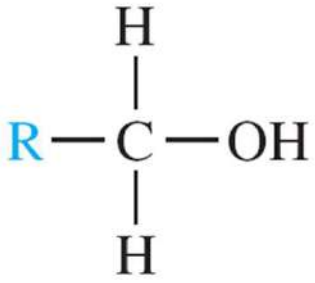


(OH in middle)

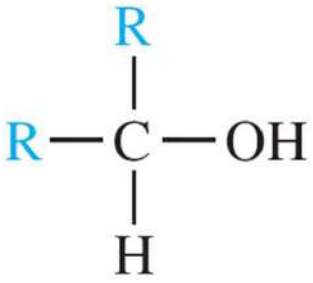
Tertiary (3°)



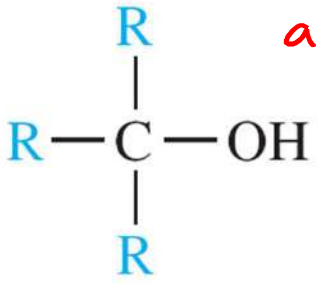
(OH in center boxed in ~~car~~ by another carbon)



primary (1°)



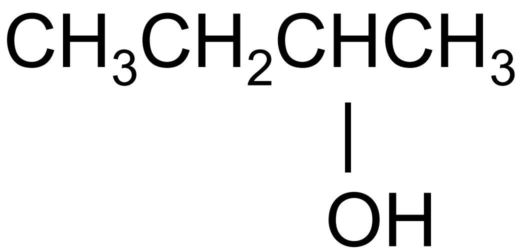
secondary (2°)

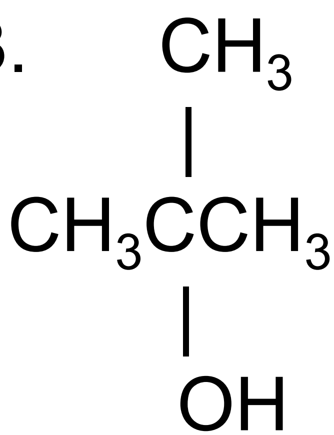


tertiary (3°)

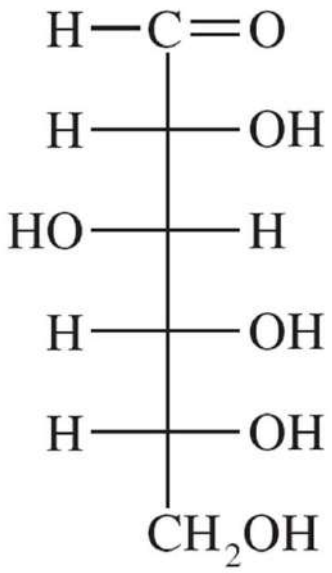
Types of Alcohols

1. $CH_3CH_2CH_2CH_2OH$

2. 

3. 

Alcohols with more than one –OH group are known as polyhydroxy alcohols. These include diols, triols, and carbohydrates like glucose.



D-glucose

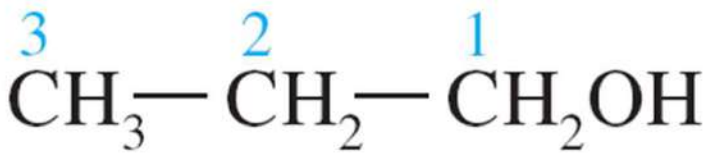
(a polyhydroxy alcohol)

IUPAC Rules for Naming Alcohols

1. Name the longest continuous carbon chain containing the hydroxyl group.

2. Drop an *–e* from the corresponding alkane parent name and add the suffix *–ol*.

For example,

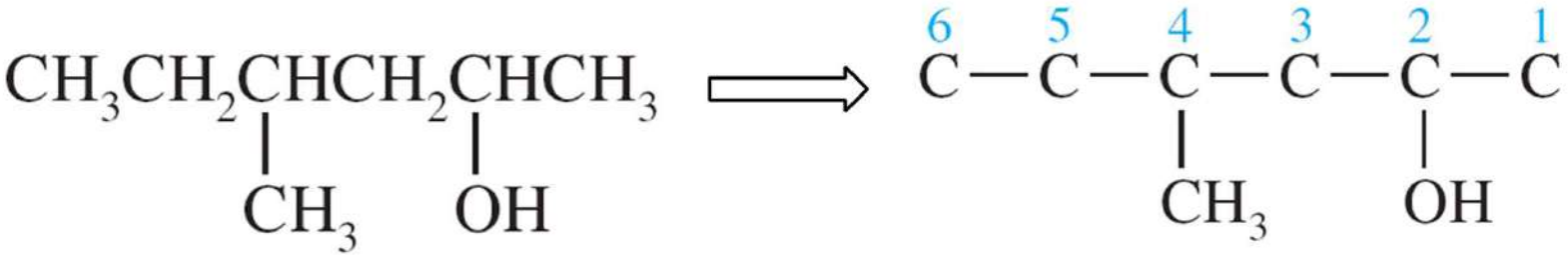


1-propanol

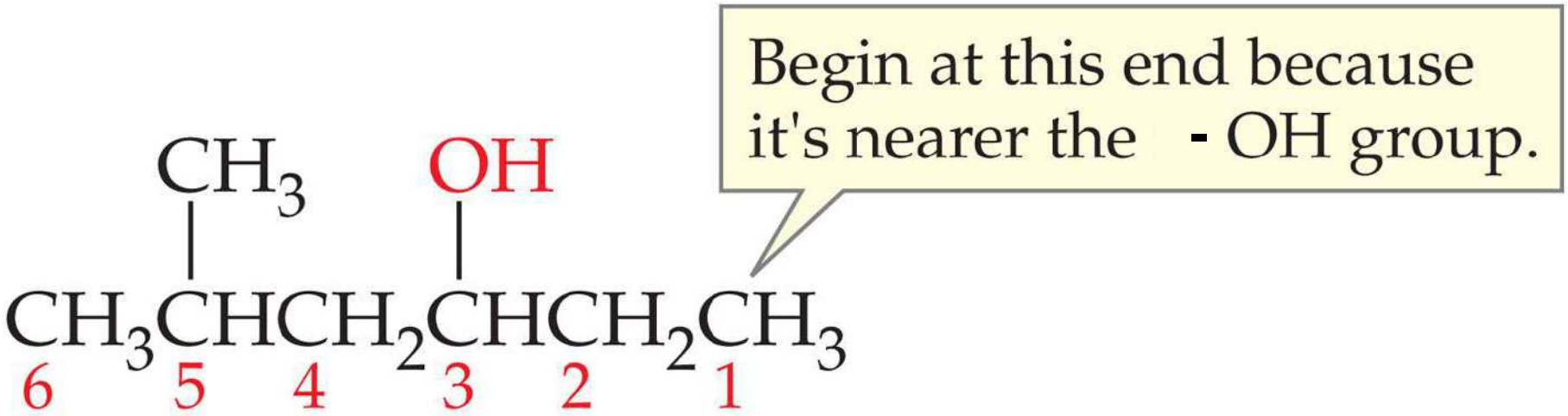
IUPAC Rules for Naming Alcohols

3. Carbon chains with three or more carbon atoms are numbered so the -OH group carbon atom is assigned the lowest possible number. This number is given as a prefix in the name.

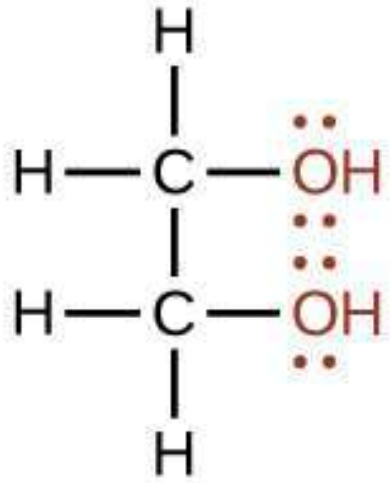
4. Attached groups are named and numbered as stated previously.

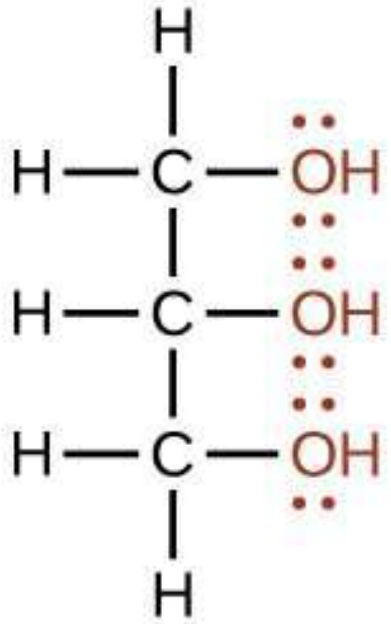


4-methyl-2-hexanol

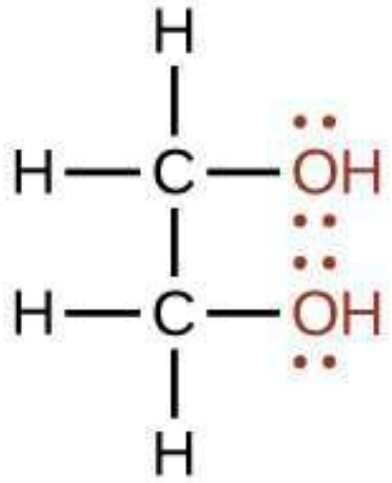


Naming Diols and Triols

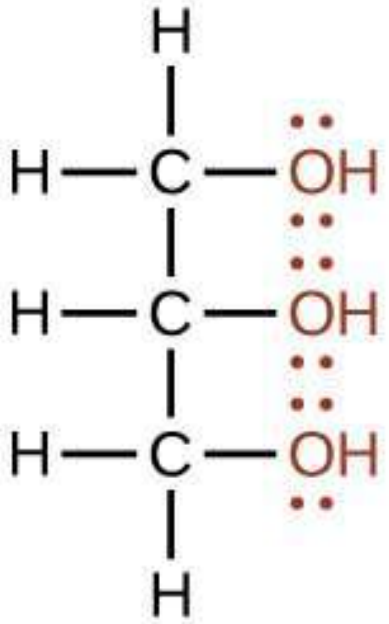




Naming Diols and Triols



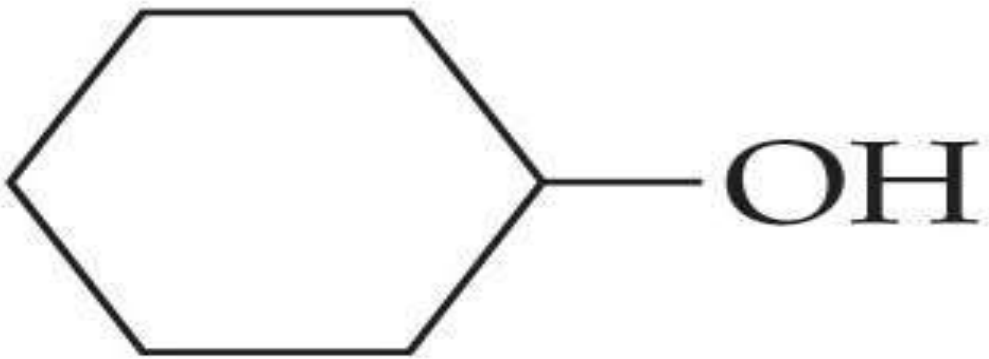
1,2-ethanediol



1,2,3-propanetriol

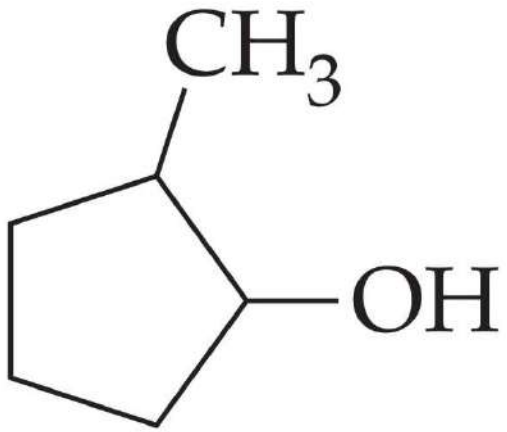
Naming Alcohols of Cycloalkanes

1. Because the –OH group is always on the number 1 carbon in a ring, the 1 is not shown in the name.



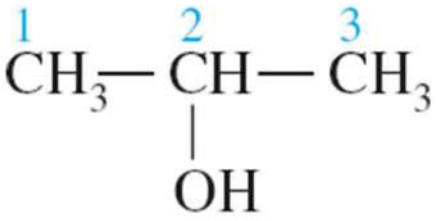
What's My Name

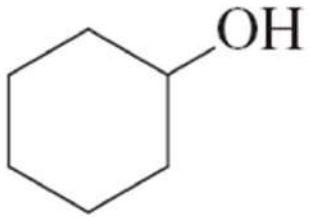
(e)

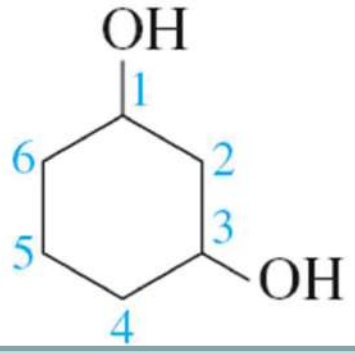


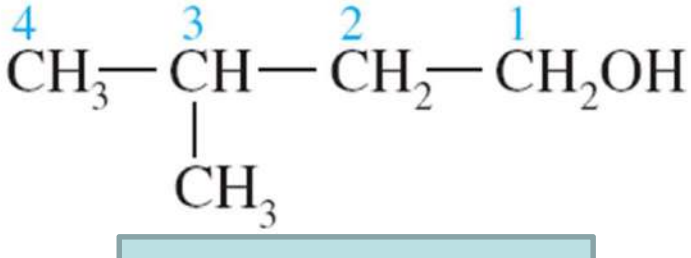
(b)

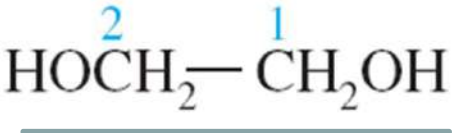
Other Examples of Naming Alcohols



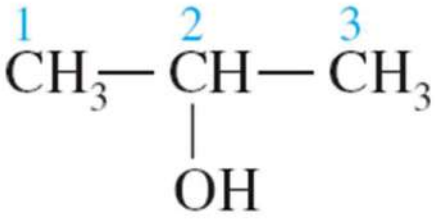




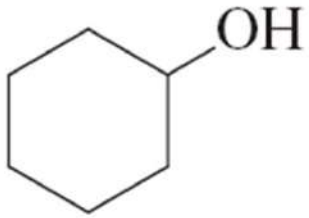




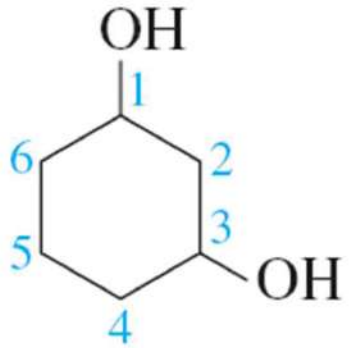
Other Examples of Naming Alcohols



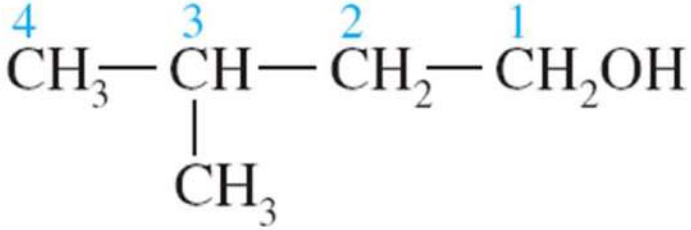
2-propanol



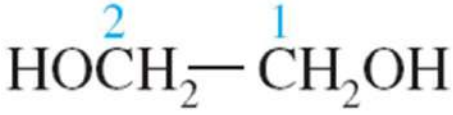
cyclohexanol



1,3-cyclohexanediol



3-methyl-1-butanol



1,2-ethanediol