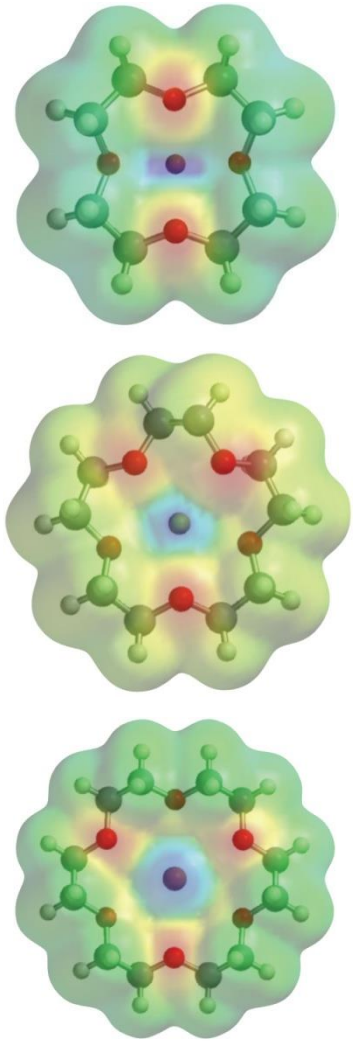
Organic Chemistry
2th Edition

Paula Yurkanis Bruice



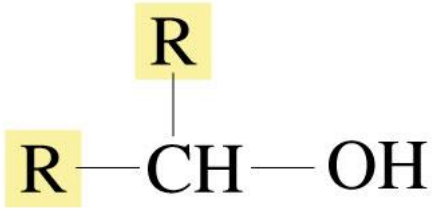
Chapter 10

Reactions of Alcohols,

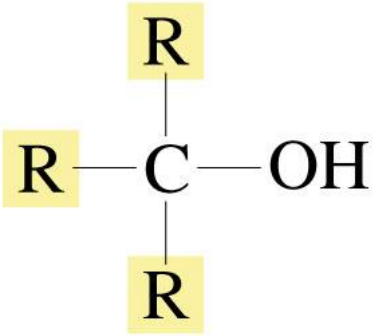
Nomenclature of Alcohols

- In an alcohol, the OH is a functional group
- A functional group is the center of reactivity in a molecule

a primary alcohol

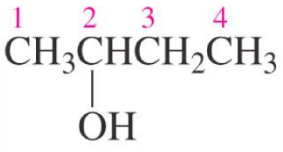


a secondary alcohol

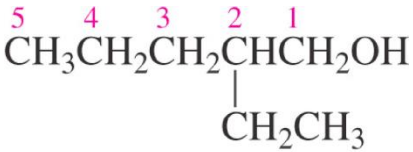


a tertiary alcohol

1. Determine the longest hydrocarbon containing the functional group and get the lowest number



2-butanol
or
butan-2-ol

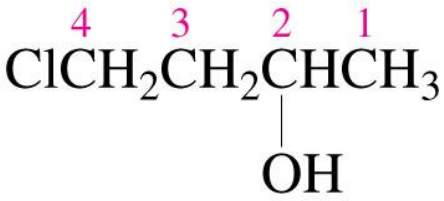


2-ethyl-1-pentanol
or
2-ethylpentan-1-ol

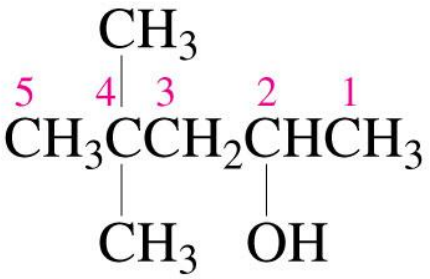
3-butoxy-1-propanol
or
3-butoxypropan-1-ol

2. When there is both a functional group suffix and a substituent, the functional group suffix gets the lowest number:

3-bromo-1-propanol

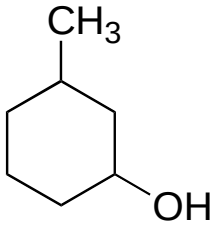


4-chloro-2-butanol

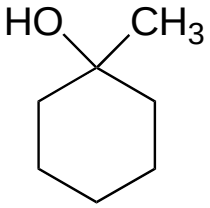


4,4-dimethyl-2-pentanol

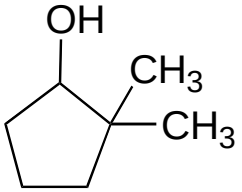
3. The functional group substituent on a ring gets the number 1, but the functional group is not numbered in the name:



3-methylcyclohexanol
not
3-methylcyclohexan-1-ol

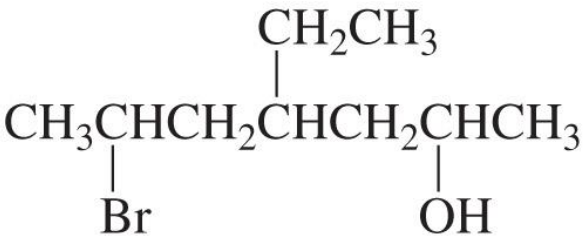


1-methylcyclohexanol
not
1-methylcyclohexan-1-ol

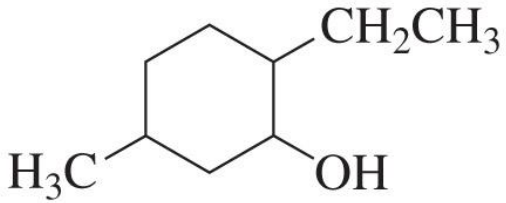


2, 2-dimethylcyclopentanol
not
2, 2-dimethylcyclopentan-1-ol

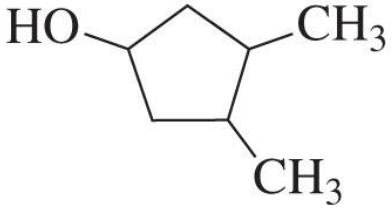
4. If there is more than one substituent, the substituents are cited in alphabetical order:



6-bromo-4-ethyl-2-heptanol

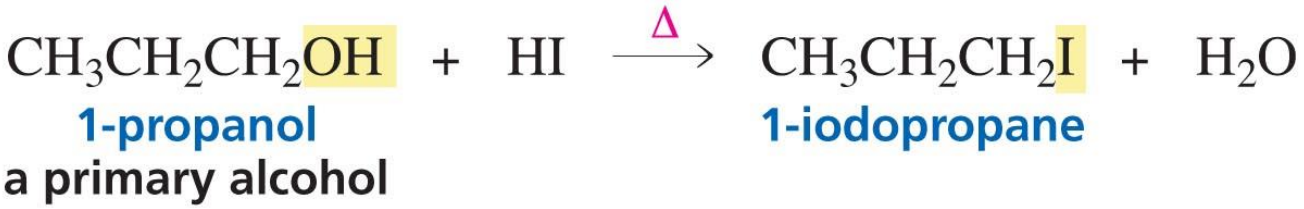


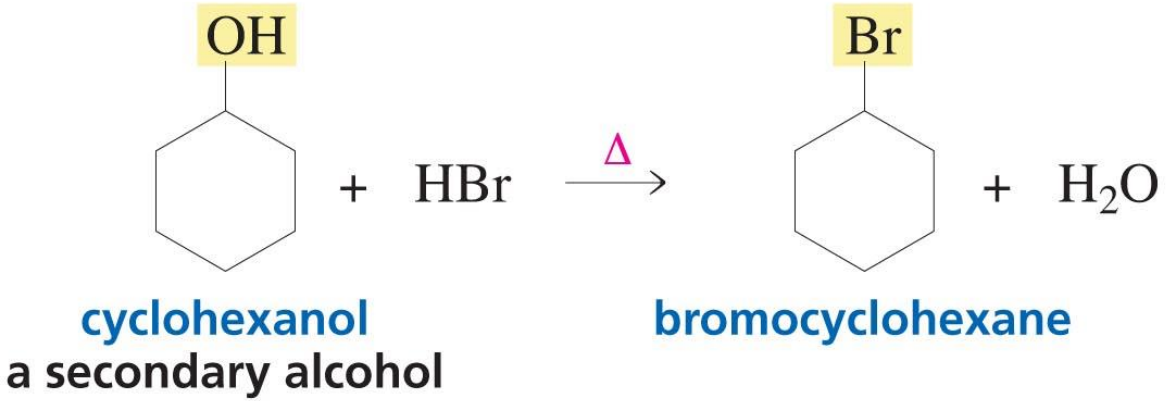
2-ethyl-5-methylcyclohexanol

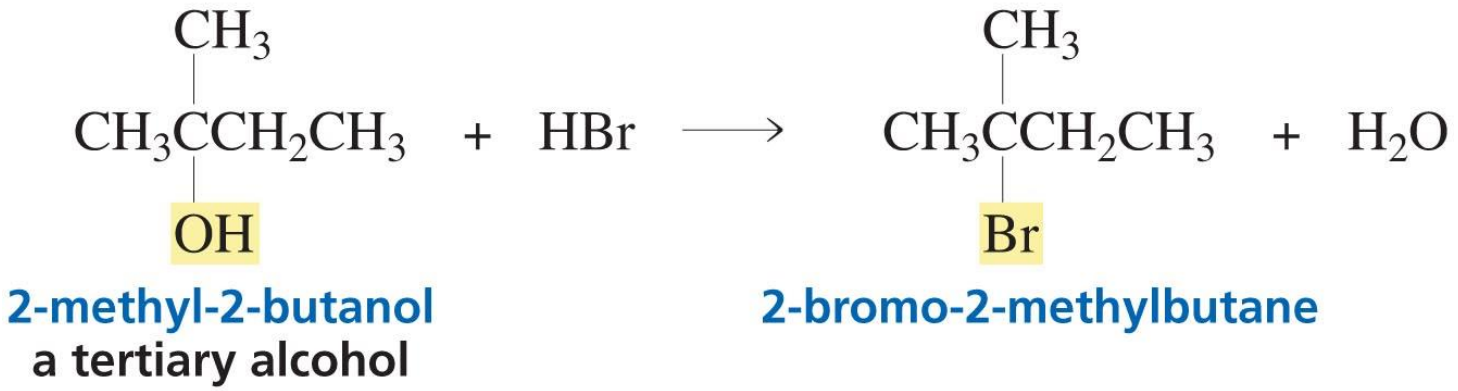


3,4-dimethylcyclopentanol

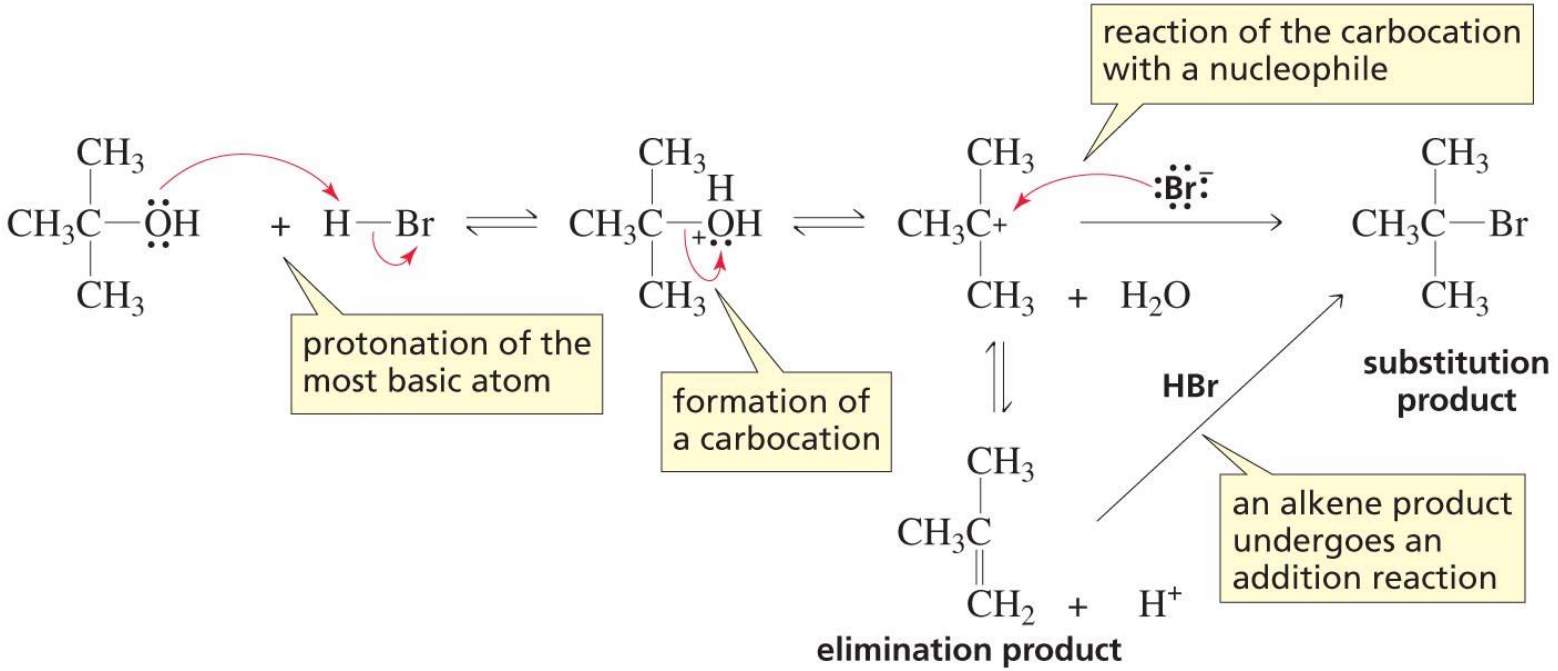
Primary, secondary, and tertiary alcohols all undergo nucleophilic substitution reactions with HI, HBr, and HCl:



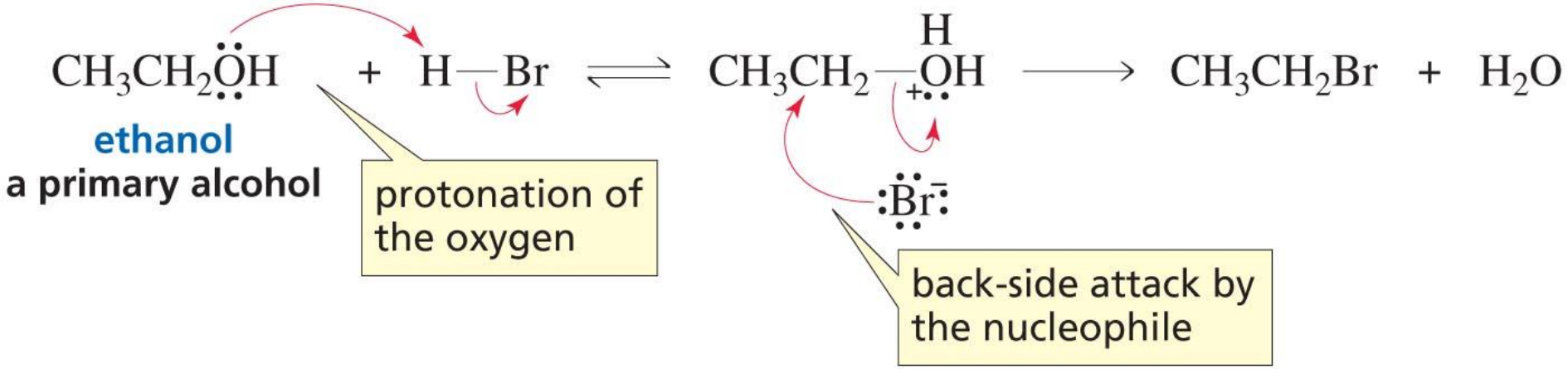




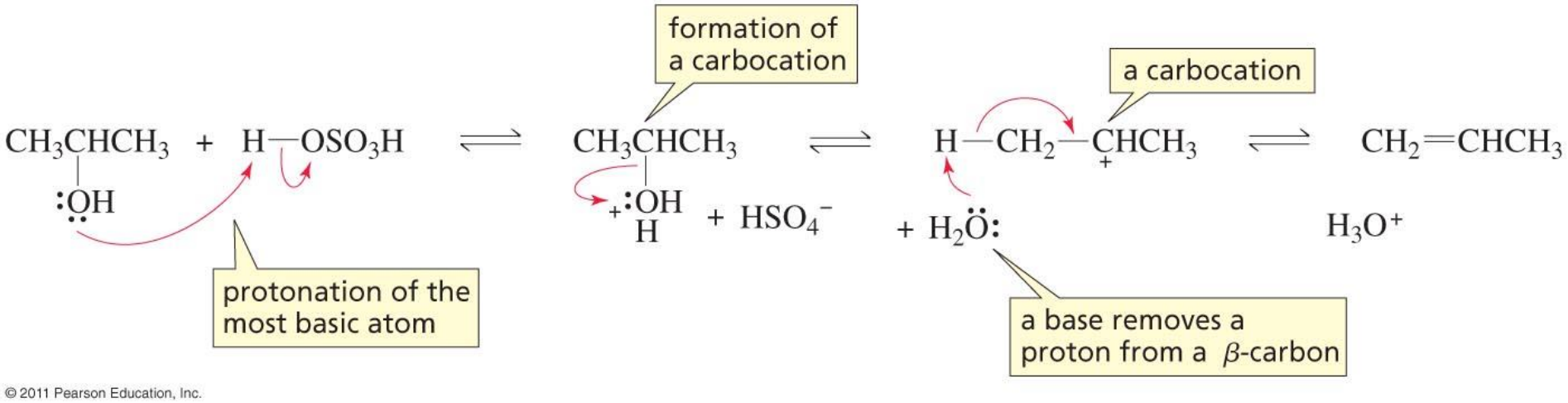
Secondary and tertiary alcohols undergo S_N1 reactions with hydrogen halides:



Primary alcohols undergo S_N2 reactions with hydrogen halides:

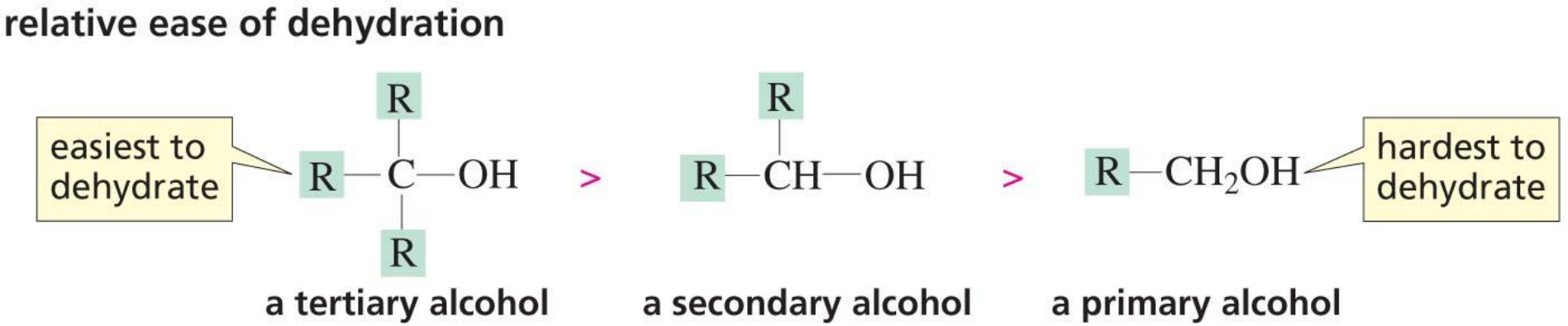


Dehydration of Secondary and Tertiary Alcohols by an E1 Pathway

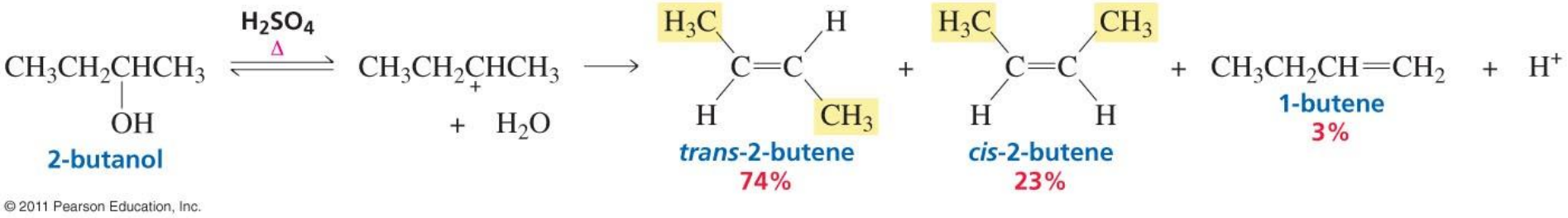


Primary Alcohols Undergo Dehydration by an E2 Pathway

The rate of dehydration reflects the ease with which the carbocation is formed:



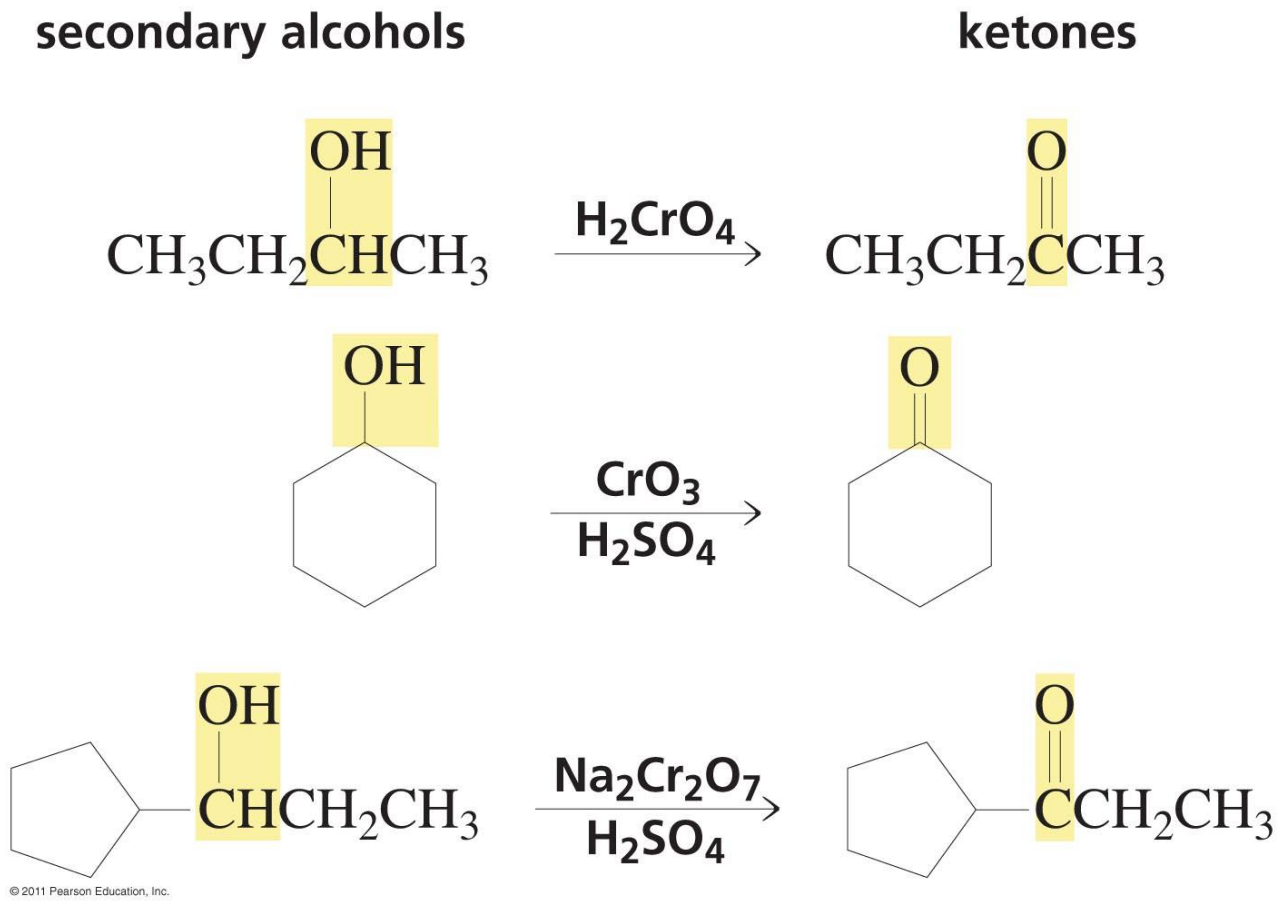
The Stereochemical Outcome of the E1 Dehydration



Alcohols and ethers undergo S_N1/E1 reactions unless they would have to form a primary carbocation

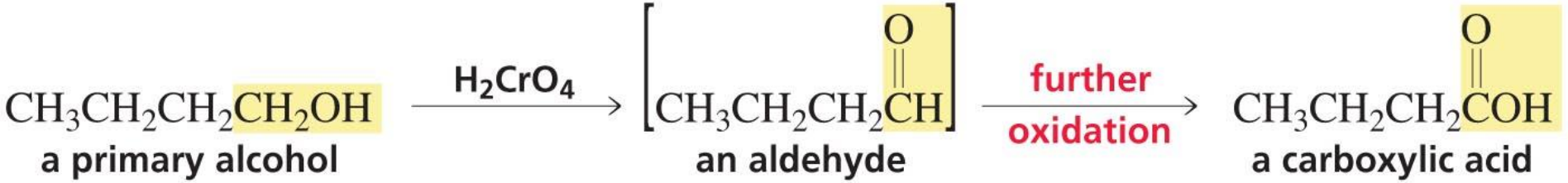
Oxidation of Alcohols

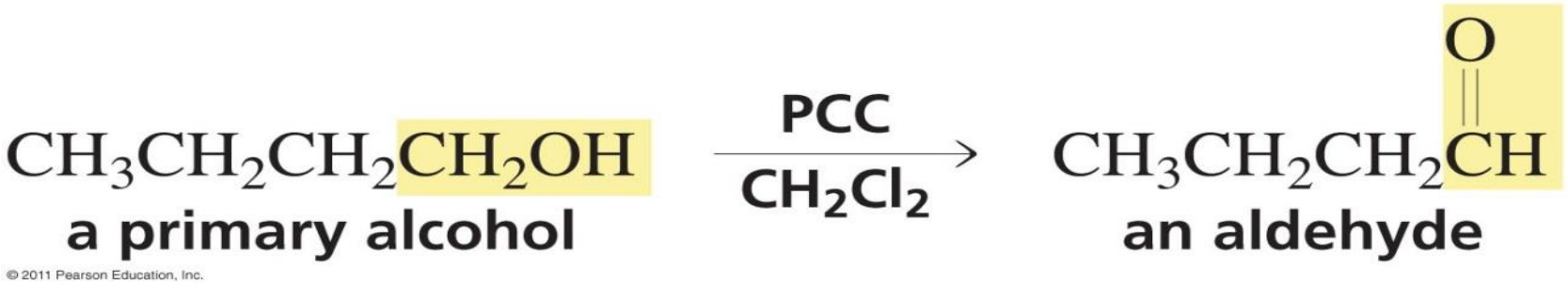
Oxidation by chromic acid:

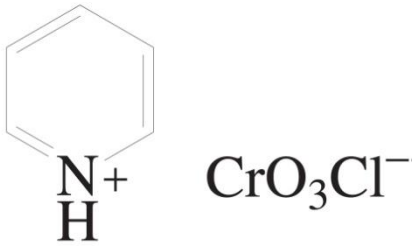


Secondary alcohols are oxidized to ketones

Primary alcohols are oxidized to aldehydes and eventually carboxylic acids:



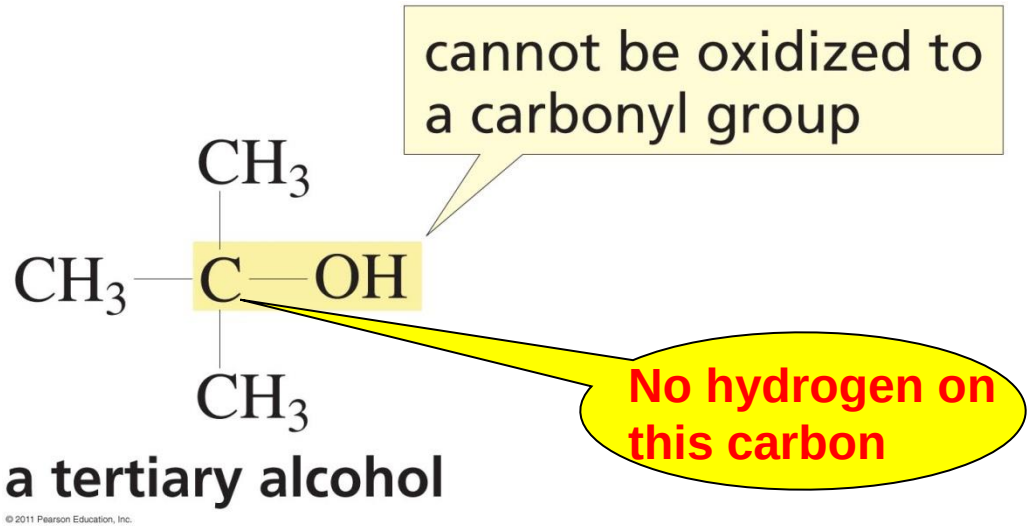


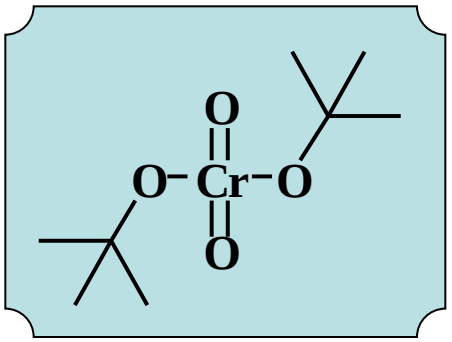


pyridinium chlorochromate

PCC

A tertiary alcohol cannot be oxidized and is converted to a stable chromate ester instead:





Di-*tert*-Butyl Chromate