

Epoxidation Of Alkenes, And Epoxides

from chapter(s) _____ in the recommended text

A. Introduction

B. Reagents And Mechanism

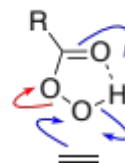
Bromination of alkenes can be drawn as loss of bromide *pushing* electrons away



bromination



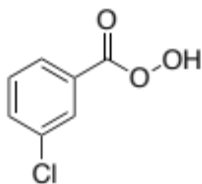
*epoxidation
general
X is leaving group*



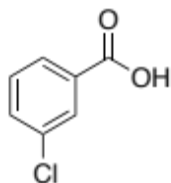
*epoxidation
with peracid*

Epoxides are 3 membered rings containing oxygen.

agents for epoxidation possess a leaving group that *pushes* electrons away becomes more polarized and *electrophilic* as it adds to an alkene.



mCPBA



*product after donation
of oxygen*



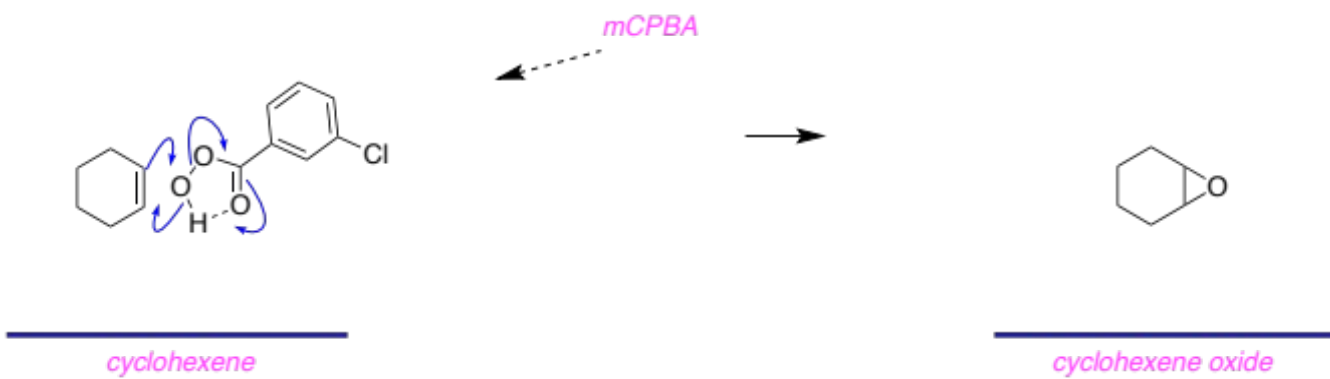
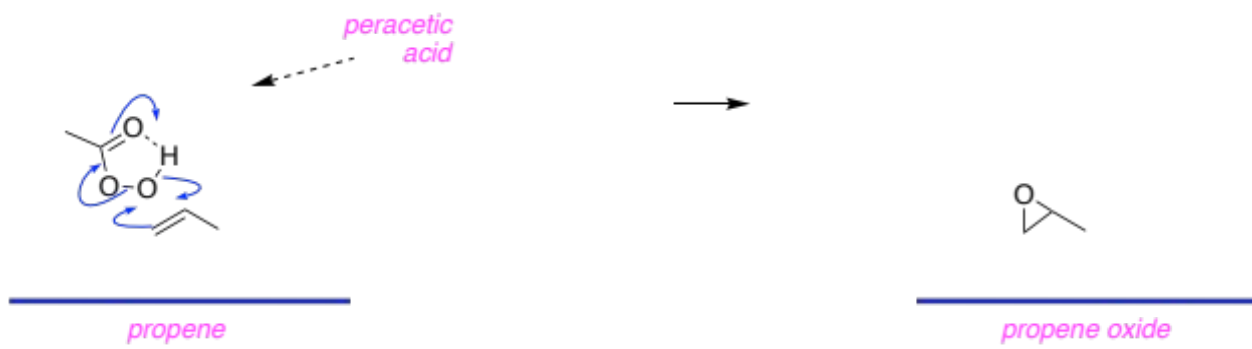
dimethyldioxirane

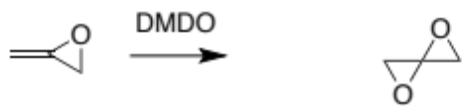
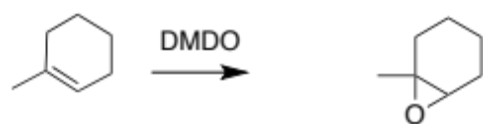
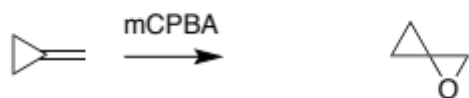
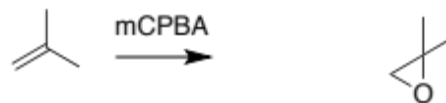


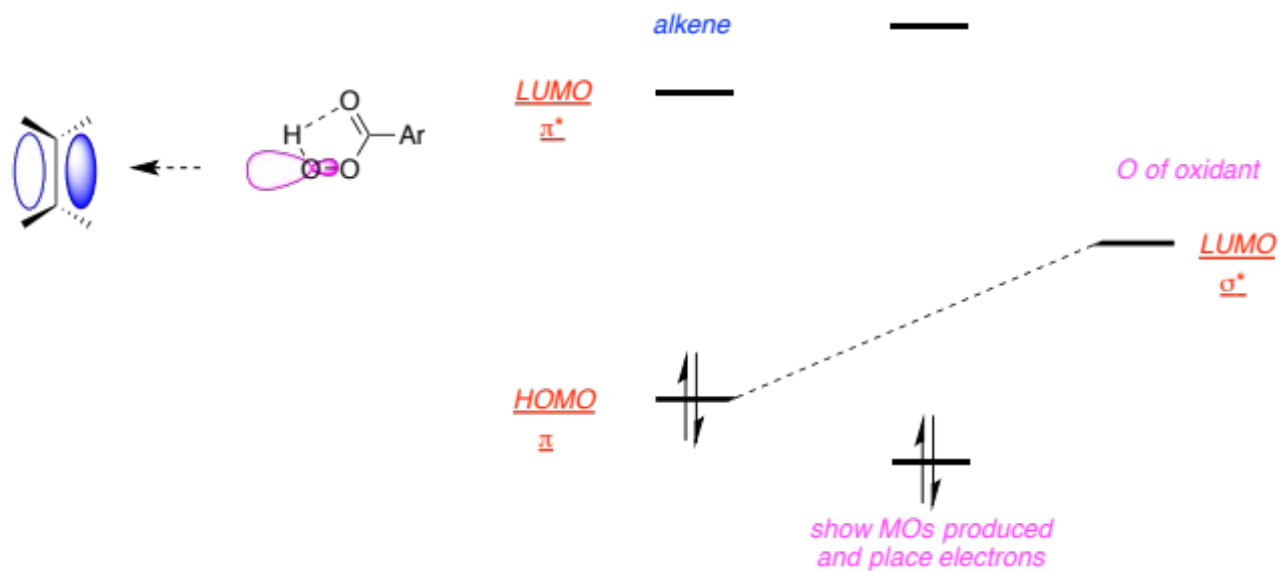
*product after donation
of oxygen*

Epoxidation usually involves *electrophilic* attack of an oxidant on an alkene therefore acts as an *electrophile*.

Epoxidation of alkenes is an *addition* reaction.



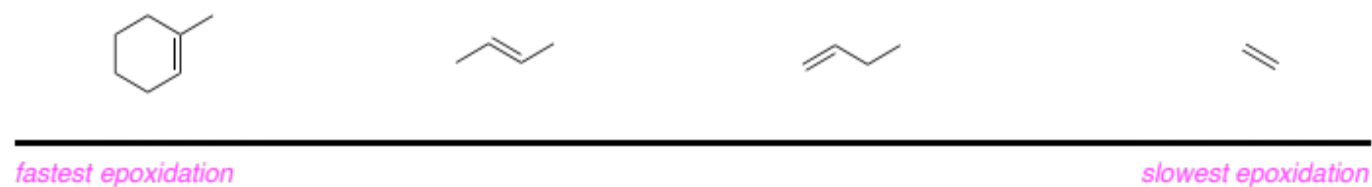




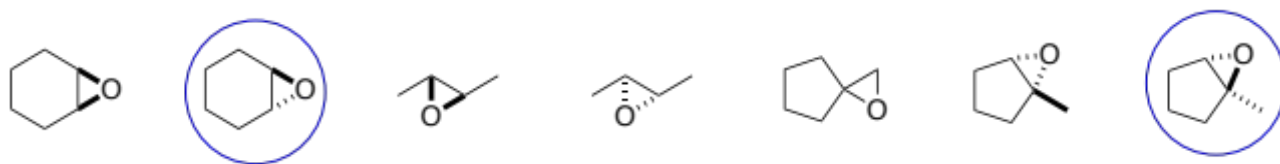
C. Rates Of Epoxidation

Epoxidation of these alkenes involves *electrophilic* attack of the agent on the alkene, so alkenes that are *more* electron rich react fastest.

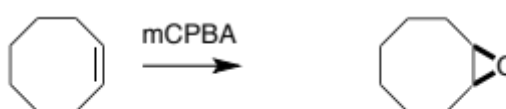
Electron densities around alkenes tend to *increase* with the number of alkyl substituents.



D. Stereospecificity

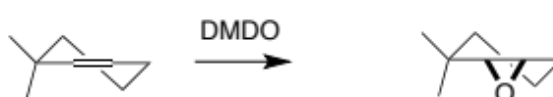
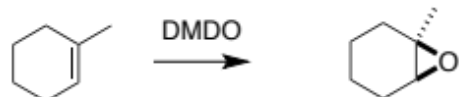


the geometry of the double bond is 100 % *conserved* in epoxidation reactions mediated by



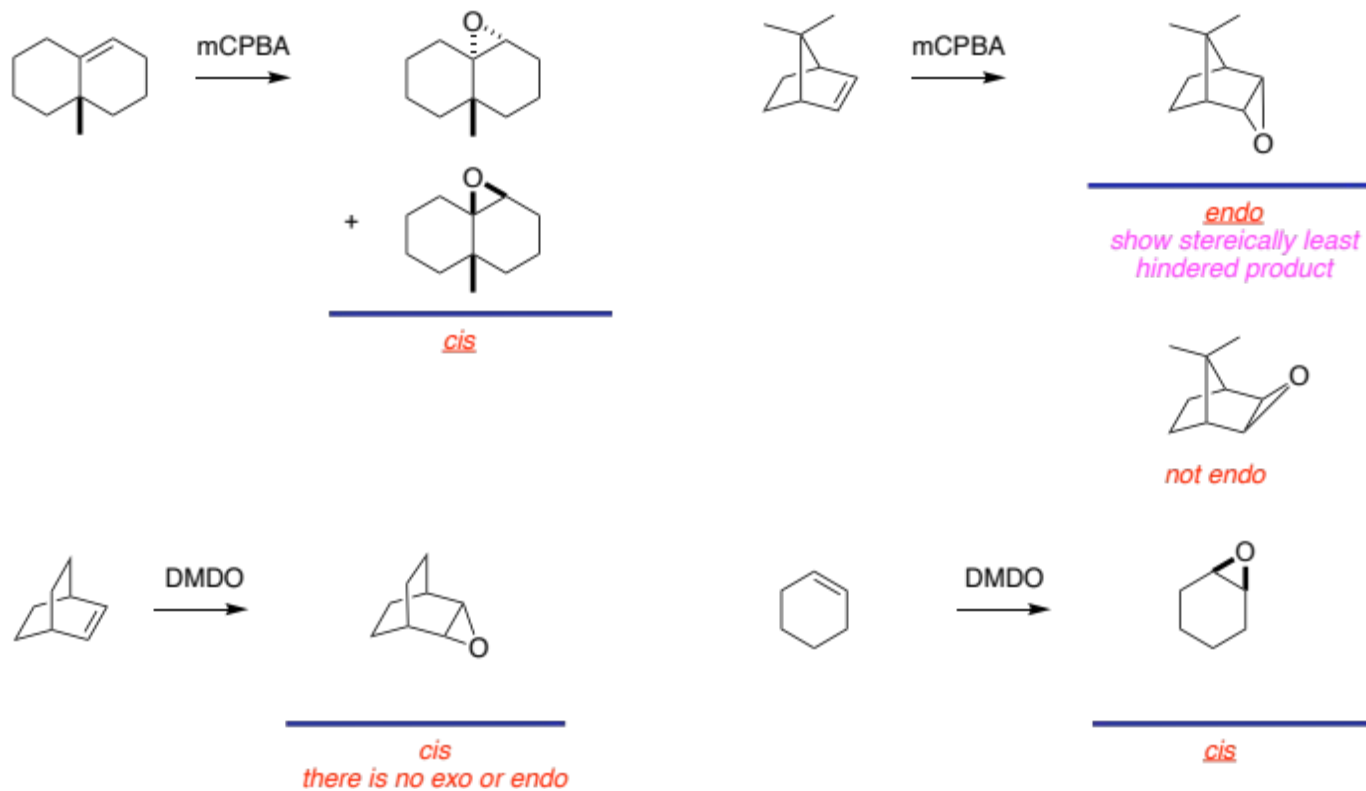
cis

cis



cis

cis



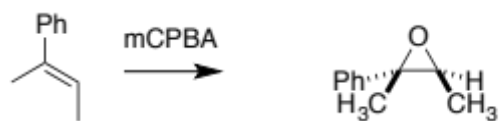
In general, epoxidations *cis*-alkenes *always* like those above give the products of *syn*-addition.

substituents attached to the epoxide *does* reflect the geometry of the alkene in these reactions, because they are also formed via *syn*- stereospecific additions.

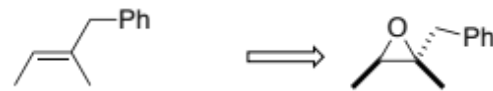
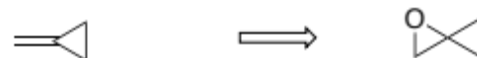
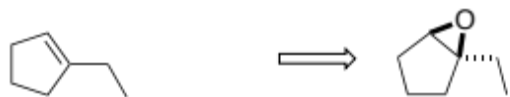




cis



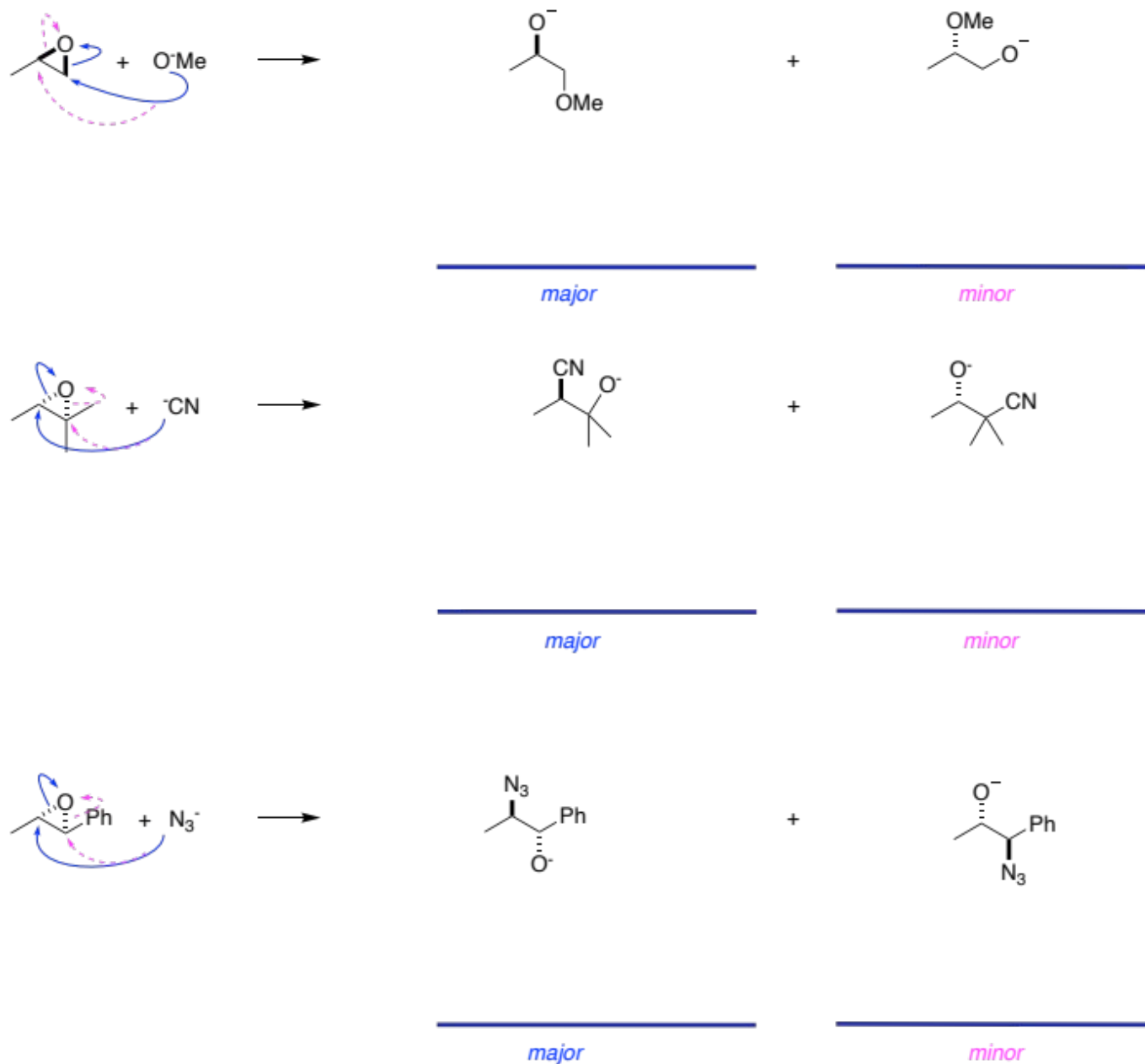
trans



E. Regioselectivity Of Epoxide Ring Opening Reactions

Under Neutral Or Basic Conditions

at least two *regioisomeric* products
it is largely dictated by *steric* factors.



so they are *regioselective* and not *regiospecific*.

Under Acidic Conditions

