Felkin-Ahn and Chelation Control

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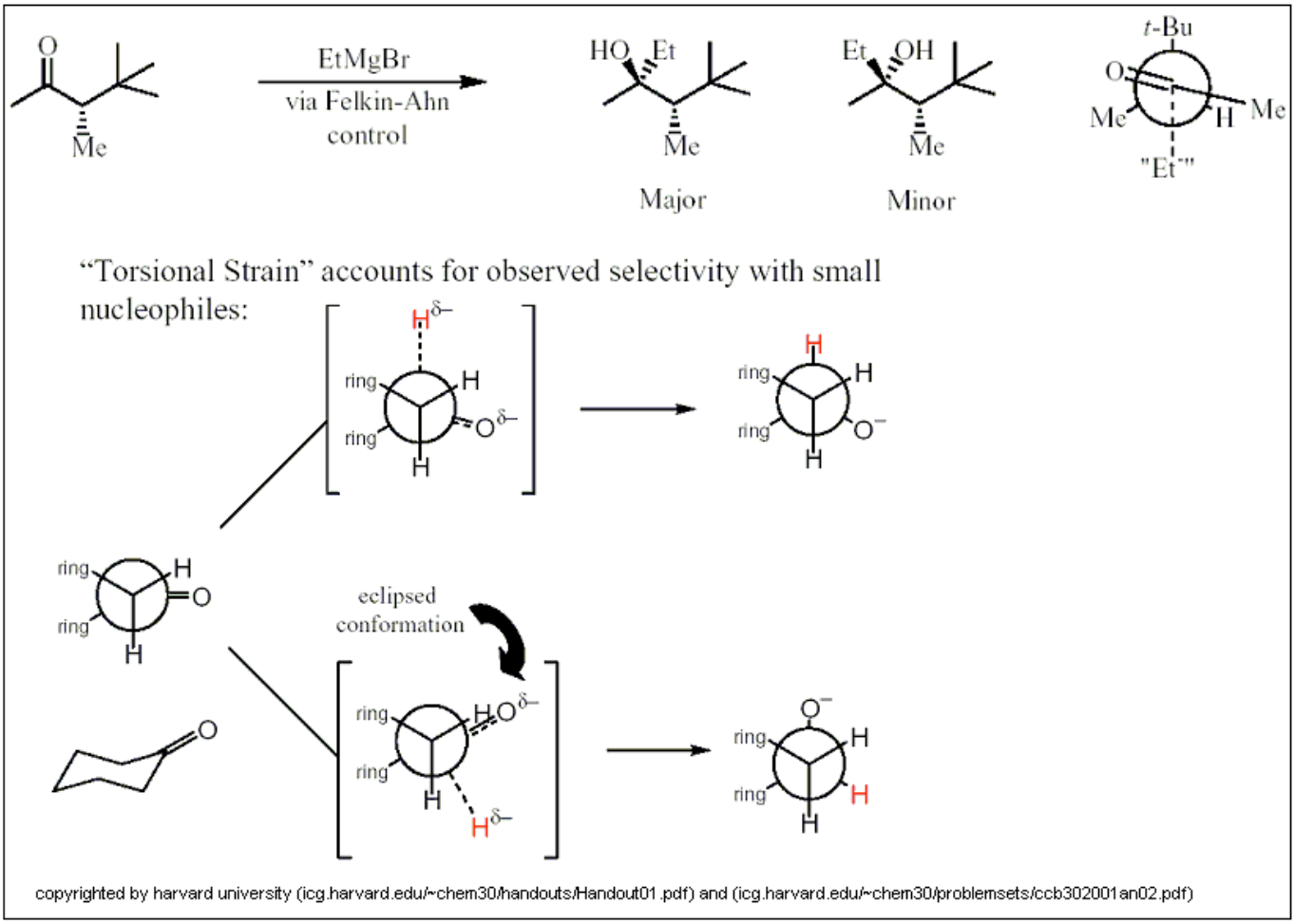
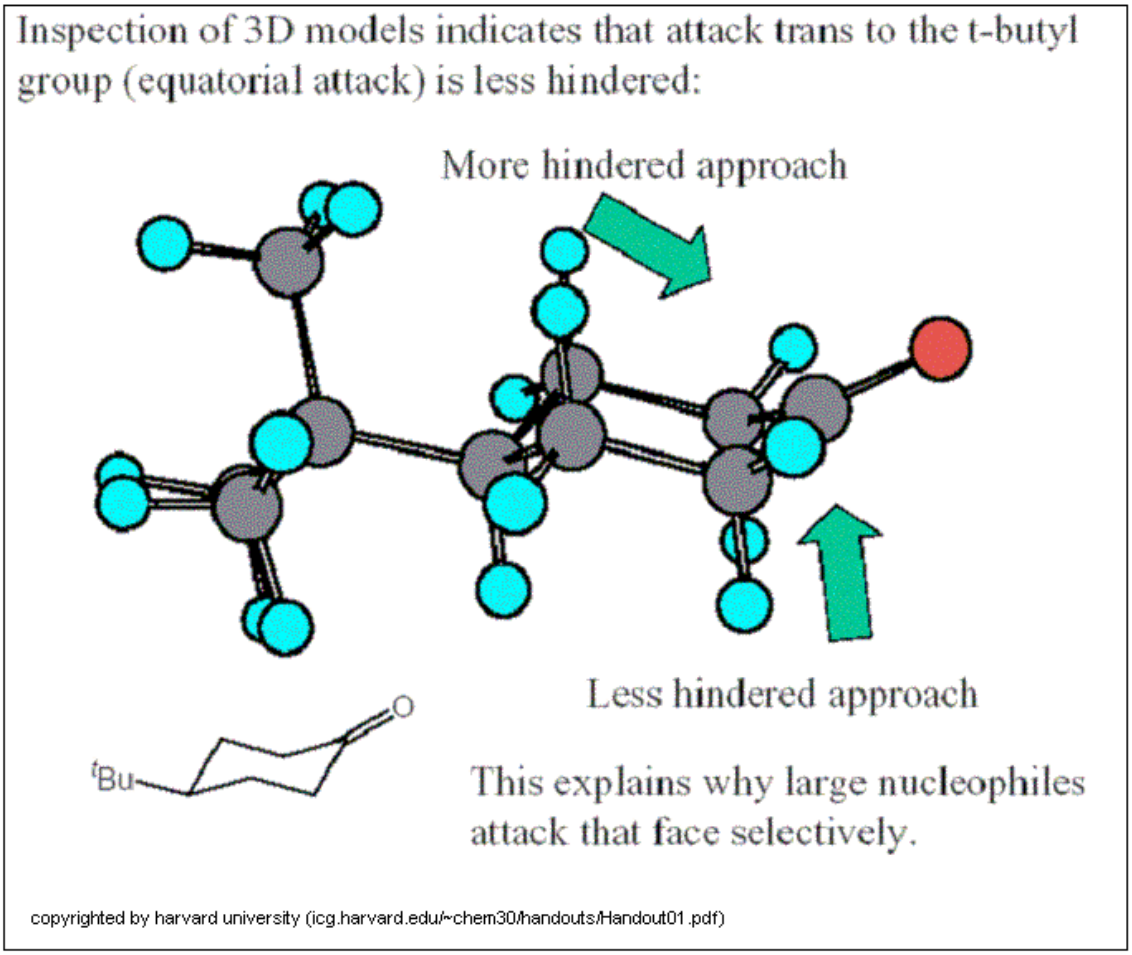
Felkin-Ahn model:

In Felkin-Ahn model, a nucleophile comes from the least hindered side. The best way to do Felkin-Ahn model is to draw a newmen projection. Then have the nucleophile attack from the smallest group.

Felkin-Ahn model example:



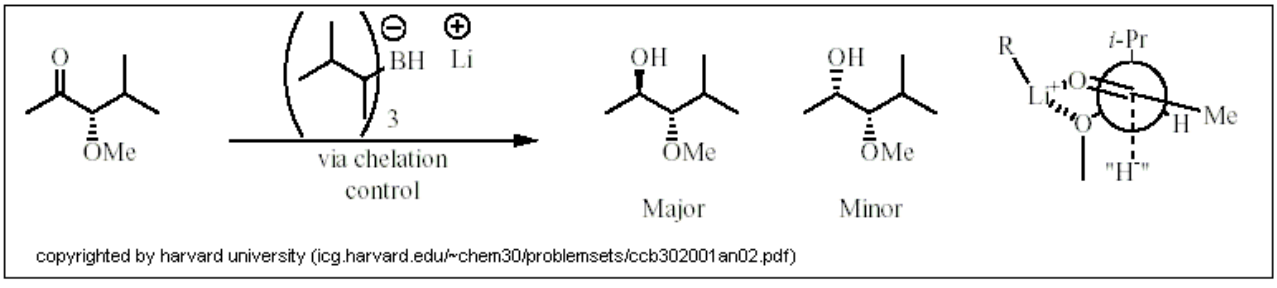
Here, the model shows that the nucleophile prefers to attack from the least hindered side.



Chelation Control:

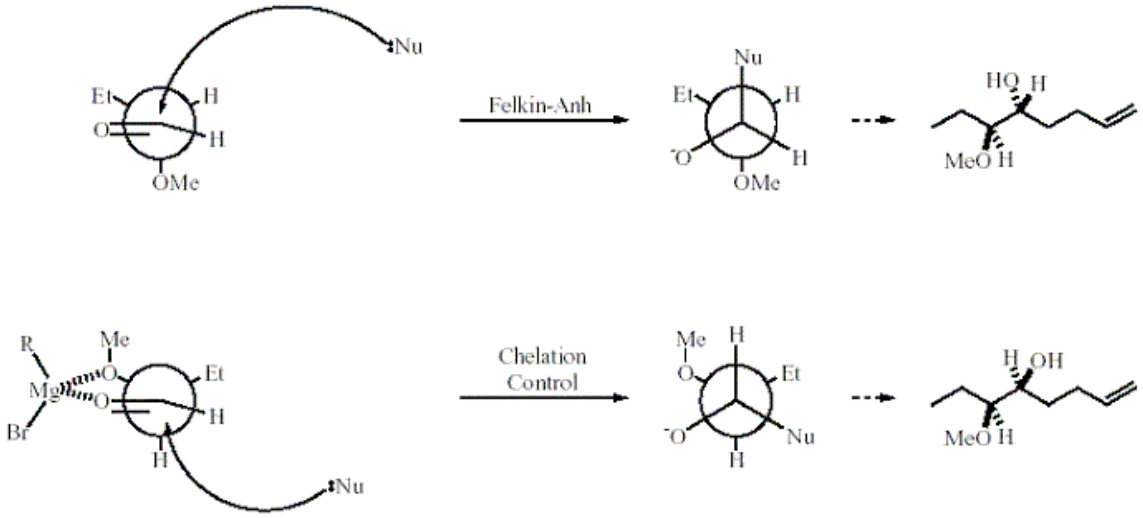
In Chelation Control there is always a lewis base or lewis acid is present. Example: Lewis Bases are OR', NR2' or SR' and lewis acids are Li+, MgX+, Zn+2. Since lewis base is present the double bonded oxygen and lewis base form a ring with lewis acid.

Chelation Control example:

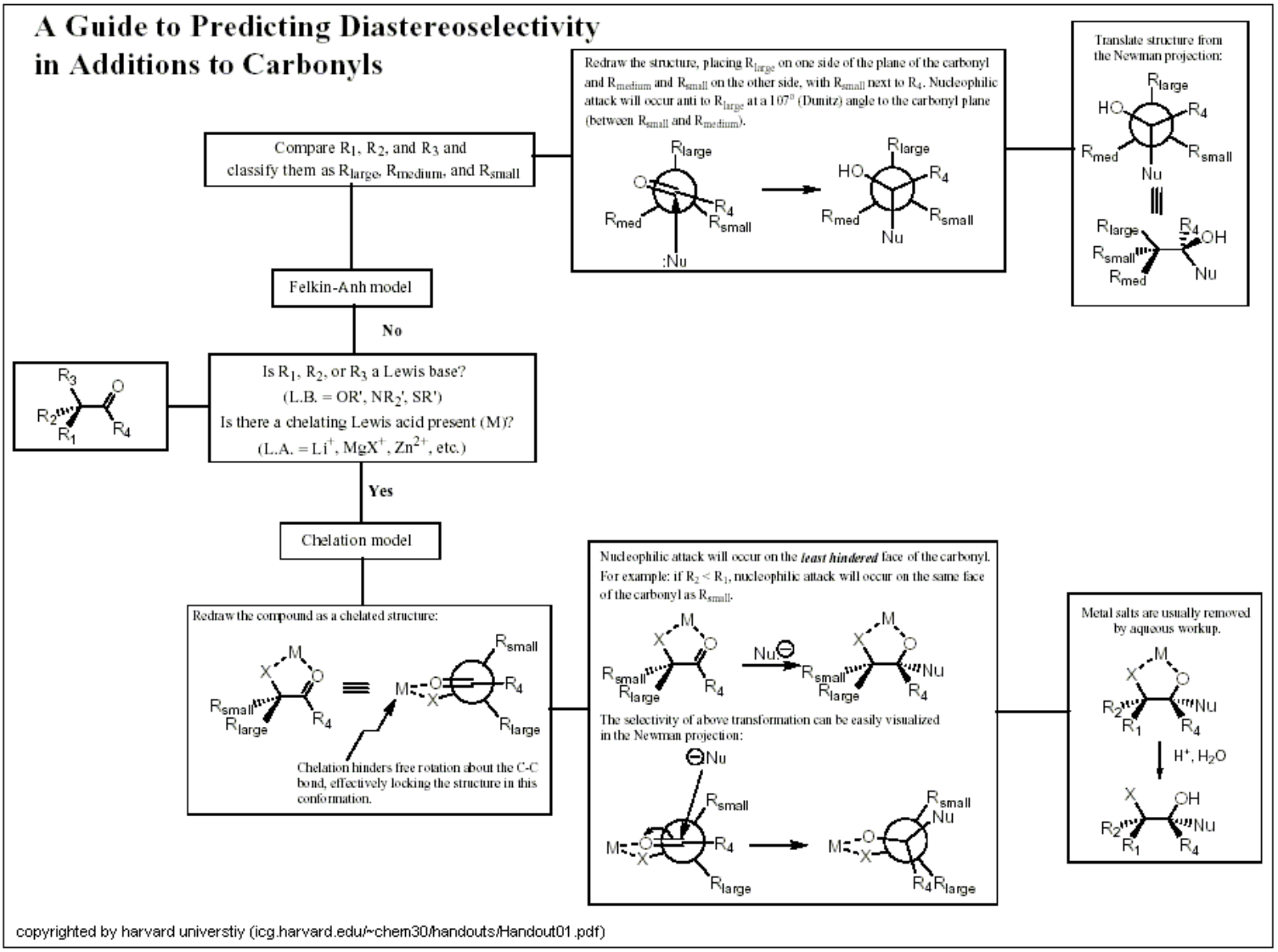


Next slide shows that when a Lewis-base or Lewis-Acid is present, Chelation Control gives the major product, by forming a ring in transition state and Felkin-Ahn models fails.

The carbon framework of the product given above can be derived from the Grignard addition of homoallylmagnesium bromide to the aldehyde obtained from Swern oxidation of the given alcohol. Felkin-Anh (R_{Large} = OMe) predicts that the product stereochemistry will favor formation of the undesired diastereomer. Under conditions of chelation control (i.e. Grignard), however, the product desired will be favored. See Lecture 5 handout on stereoselectivity of carbonyl additions for further clarification.



In General: How to choose between Felkin-Ahn and Chelation Control:



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