

The logo of Galgotias University is a stylized circular emblem composed of several overlapping, curved segments in shades of yellow, orange, and blue, resembling a sun or a globe.

Stereochemistry of Ketone Reduction

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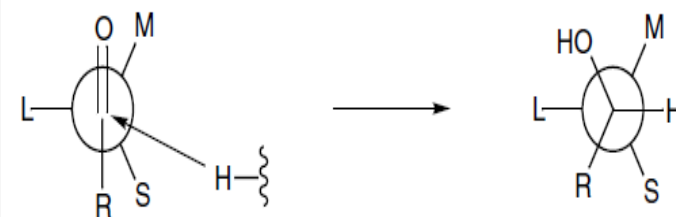
TOPICS TO BE COVERED

- Stereochemistry of Ketone
- Axial-Axial Interaction
- Stereochemistry of Ketone reduction in case of Hindered Ketone
- Stereochemistry of Ketone reduction in case of Unhindered Ketone
- Problems

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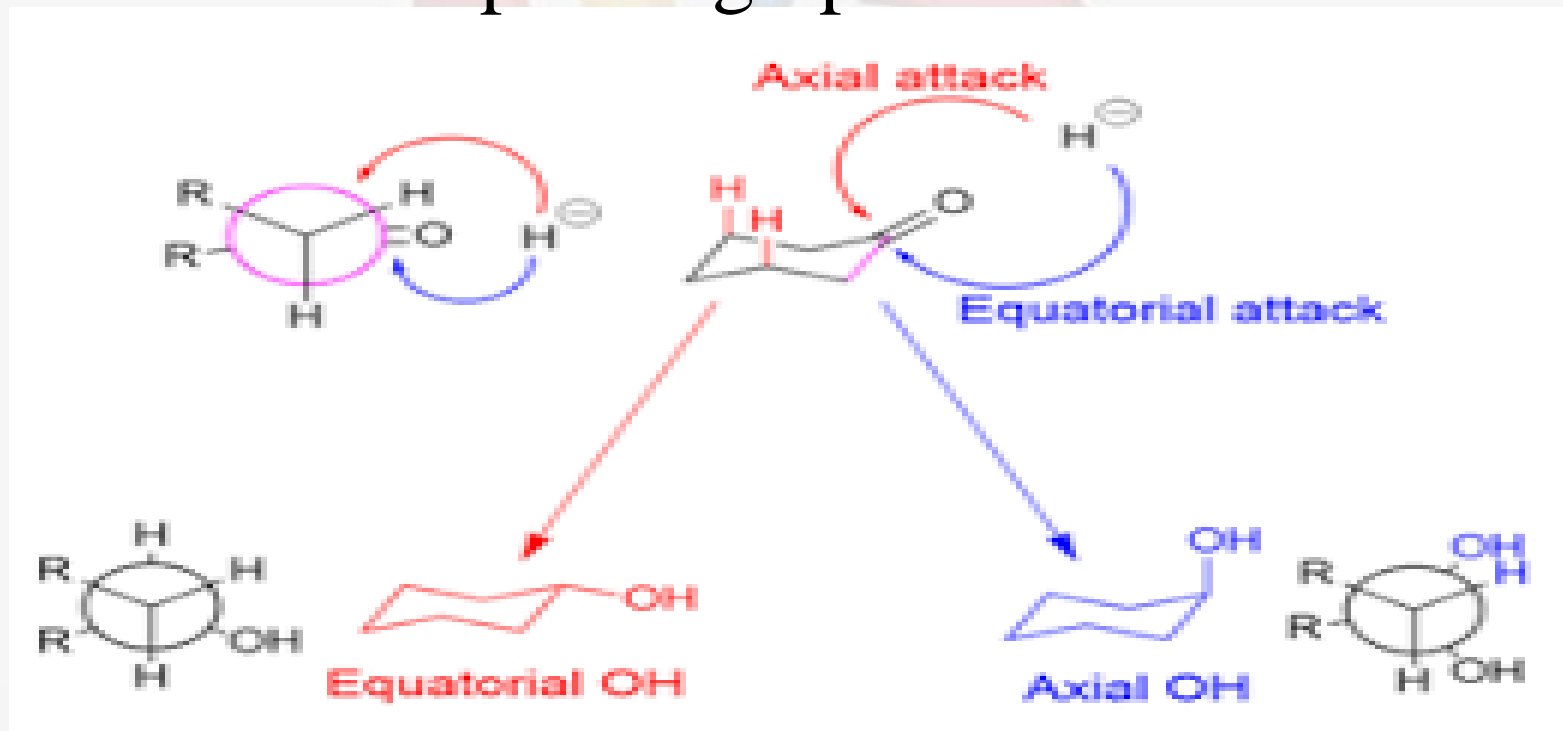
Stereochemistry of Ketone Reduction

The main product formed in these reactions can be predicted on the basis of the Felkin–Anh model (see also Cram's rule, see Section 1.1.5). The diastereomer which predominates is that formed by approach of the reagent to the less-hindered side of the carbonyl group when the rotational conformation of the molecule is such that the largest group on the adjacent chiral centre is perpendicular to the carbonyl group. This is best depicted using Newman projections, where S, M and L represent small, medium and large substituents (7.67). Thus, for the reduction of the ketone **81**, the predominant *anti* alcohol arises by attack of the metal hydride on the less hindered side of the carbonyl group in the conformation shown. The selectivity obtained in these reactions increases with the bulk of the reducing agent and some highly stereoselective reductions have been achieved by using complex hydride agents.

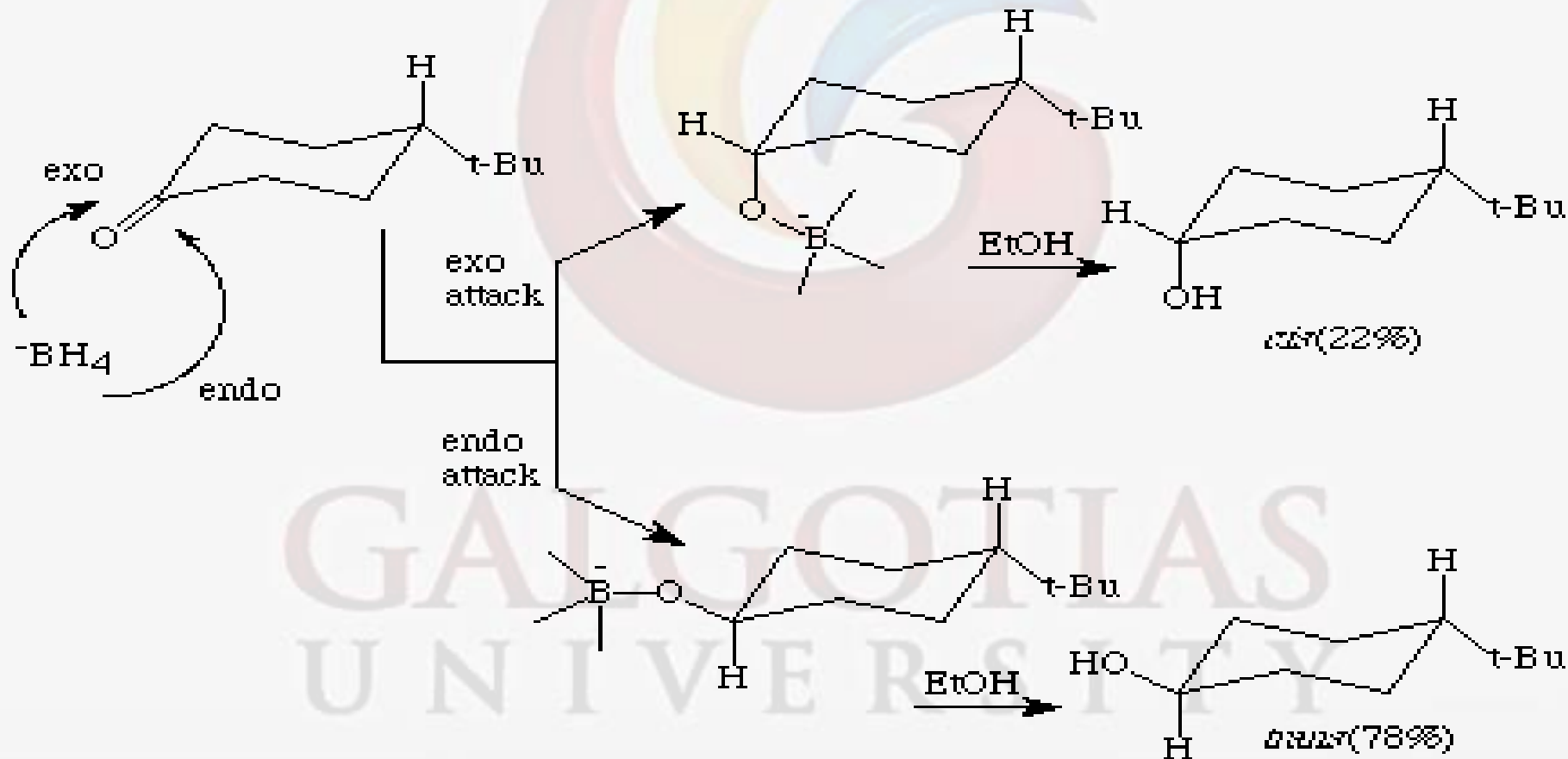


Stereochemistry of Ketone Reduction

In case of cyclic system, there is both axial and equatorial attack depending upon the substituents.



In case of unhindered ketone, reduction with metal hydride will favour endo attack giving equatorial alcohol

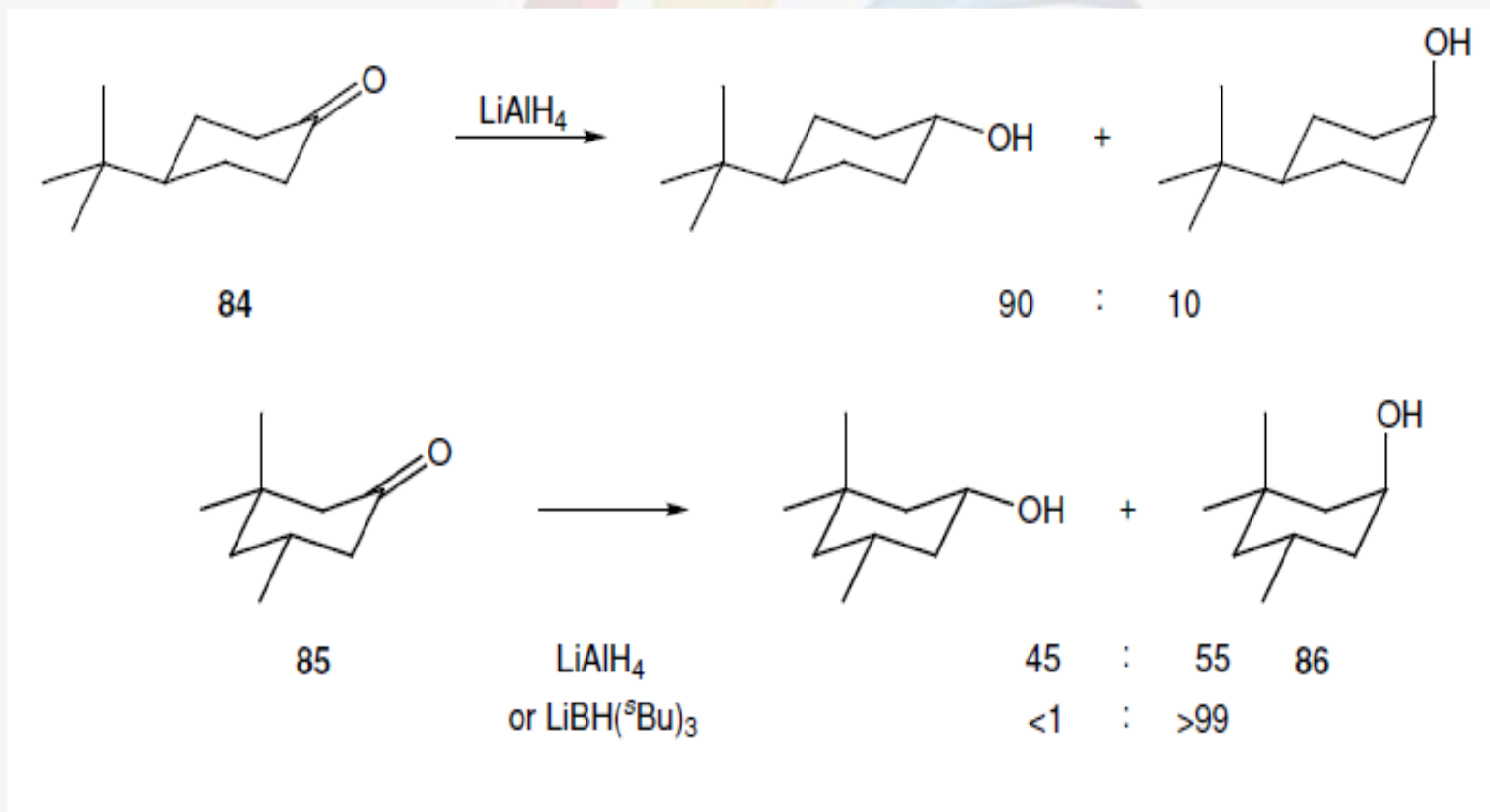


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In case of unhindered ketone, reduction with metal hydride will give equatorial alcohol as major product and with hindered ketone axial alcohol is the major product.

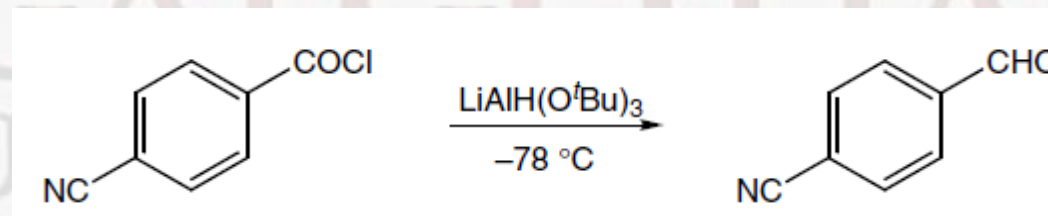
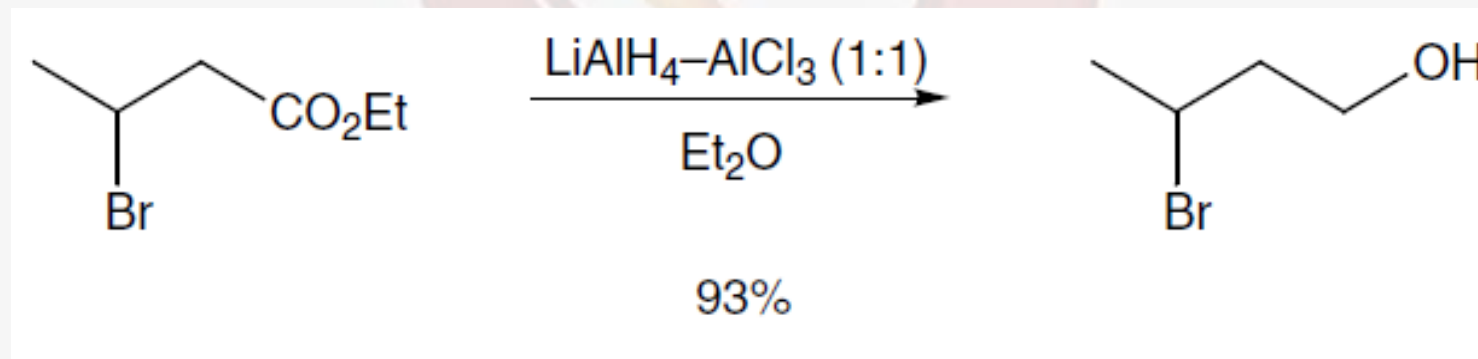
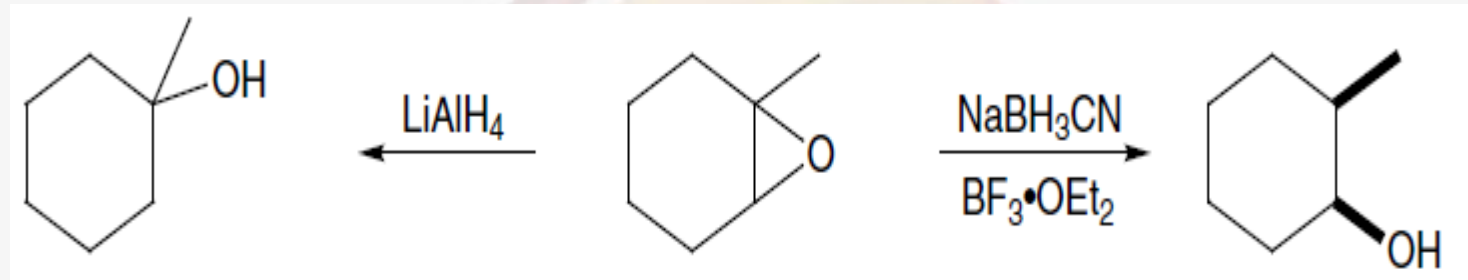


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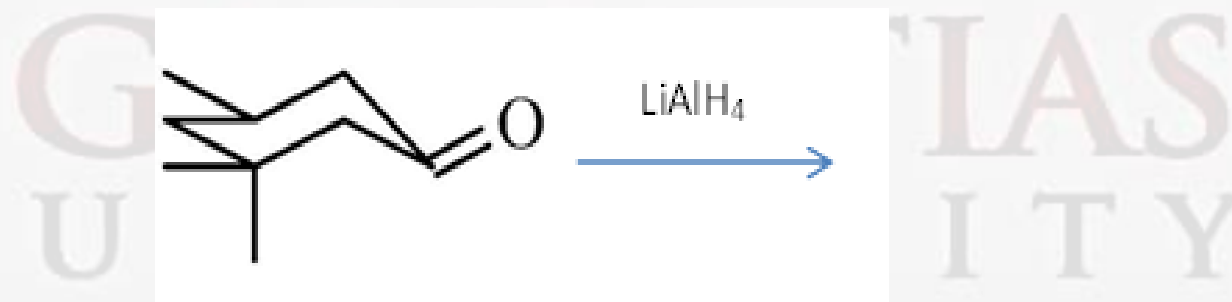
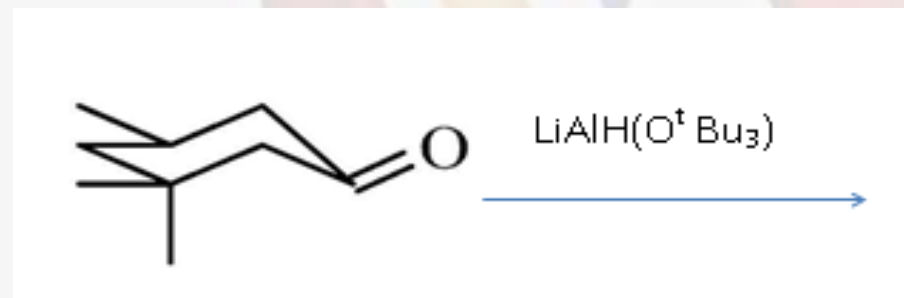
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More Examples



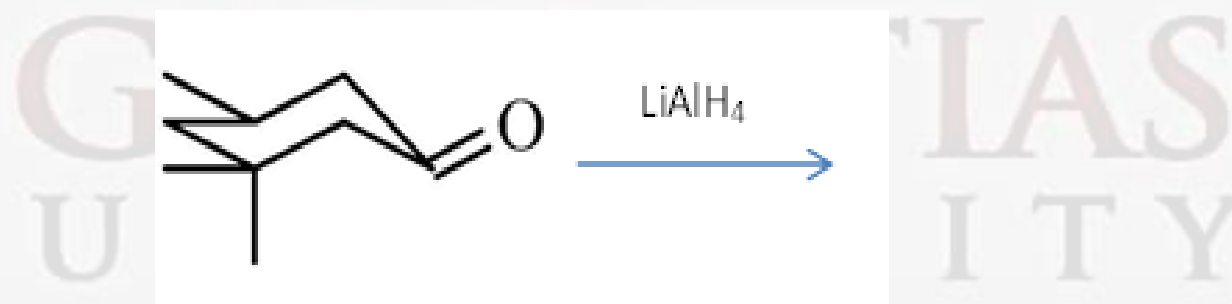
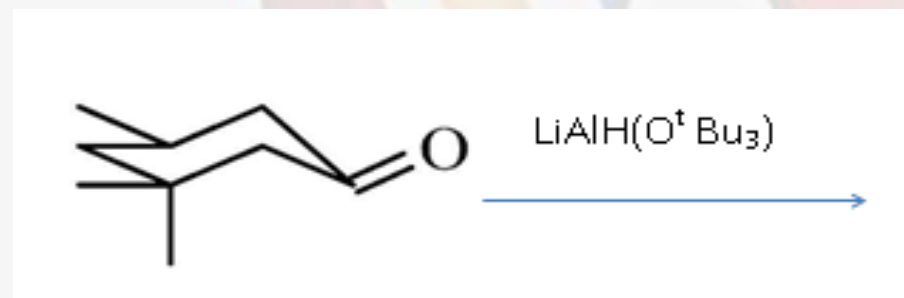
Problems

Analyze the product and stereochemistry of following reaction with explanation.



Problems

Analyze the product and stereochemistry of following reaction with explanation.



References

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- J. Clayden, N. Greeves and S. Warren, Organic Chemistry, Oxford University Press, 2nd edition, 2012.
- T.L. Gilchrist, Heterocyclic Chemistry, 3rd edition, Addison-Wesley Longman Ltd., England, 1997.
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