

The logo of Galgotias University is a circular emblem with a stylized 'G' shape in the center. The 'G' is composed of three curved segments in shades of yellow, blue, and red. The background of the emblem is a light, multi-colored gradient.

Peterson olefination Reaction

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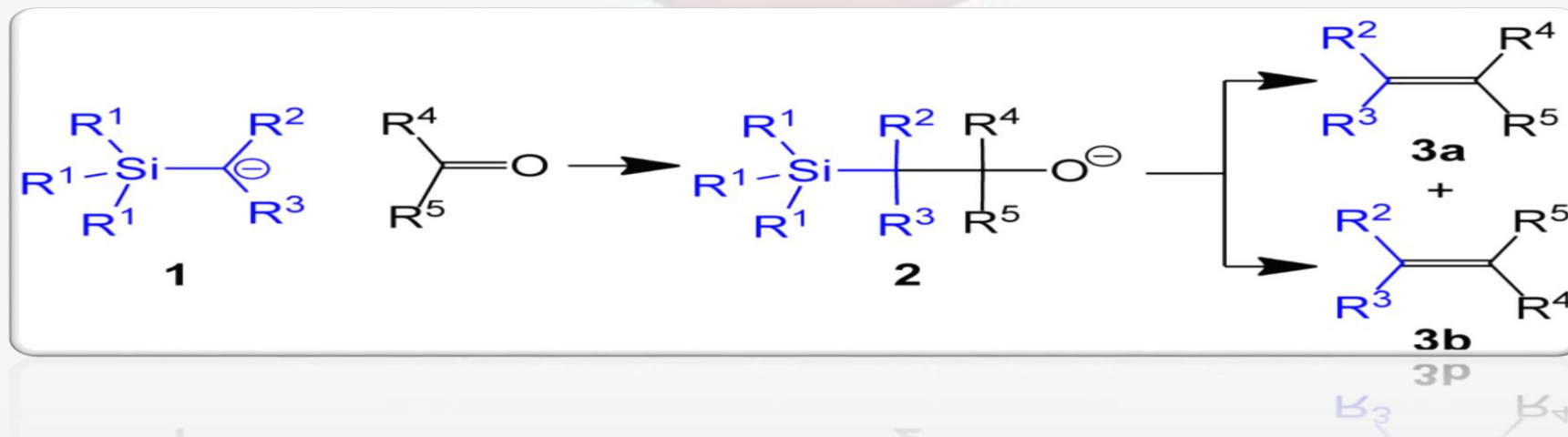
TOPICS COVERED

- Peterson Olefination Reaction
- Mechanism in presence of Acid
- Mechanism in presence of Base
- Reactions related to topic
- More examples

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What is Peterson Olefination

The Peterson olefination (also called the Peterson reaction) is the chemical reaction of α -silyl carbanions with ketones (or aldehydes) to form a β -hydroxysilane which eliminates to form alkenes.



Mechanism of Peterson Olefination

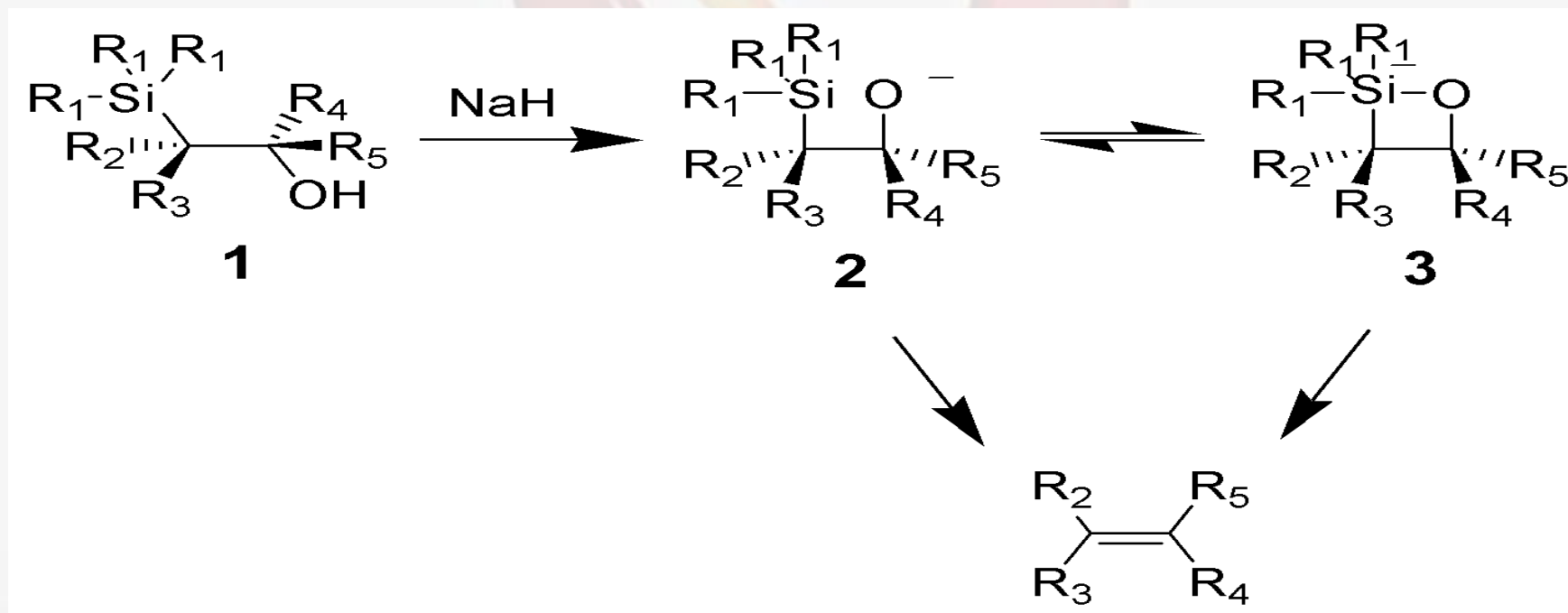
One attractive feature of the Peterson olefination is that it can be used to prepare either cis- or trans-alkenes from the same β -hydroxysilane. Treatment of the β -hydroxysilane with acid will yield one alkene, while treatment of the same β -hydroxysilane with base will yield the alkene of opposite stereochemistry.

In the first step of the Peterson Olefination, addition of the silylcarbanion to a carbonyl compound and subsequent aqueous work up leads to diastereomeric adducts.

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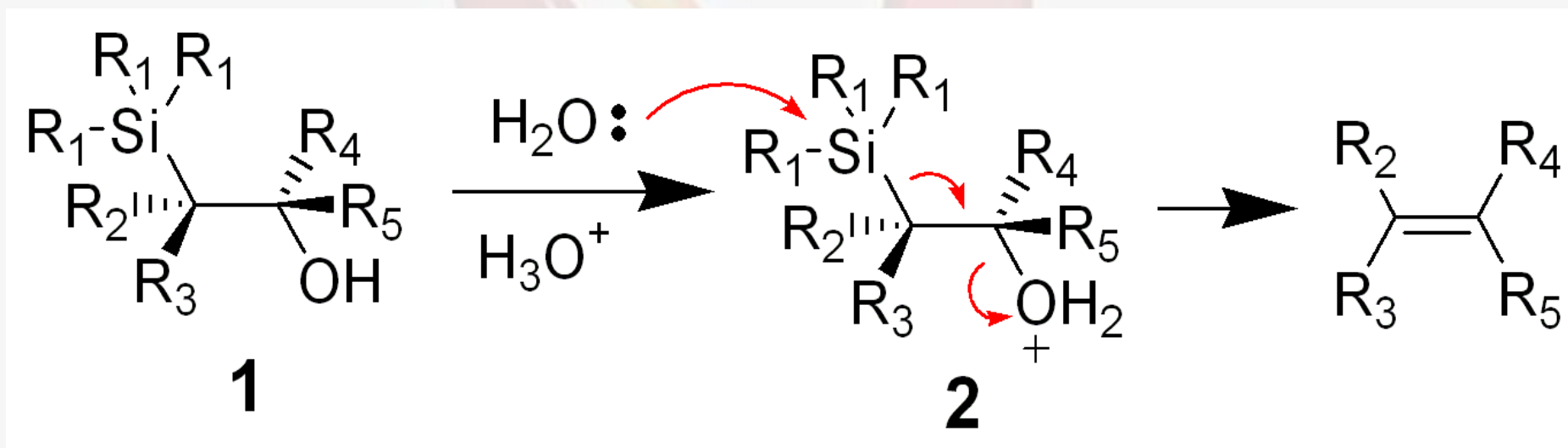
Basic elimination

The action of base upon a β -hydroxysilane (**1**) results in a concerted *syn* elimination of (**2**) or (**3**) to form the desired alkene. The penta-coordinate silicate intermediate (**3**) is postulated, but no proof exists to date.



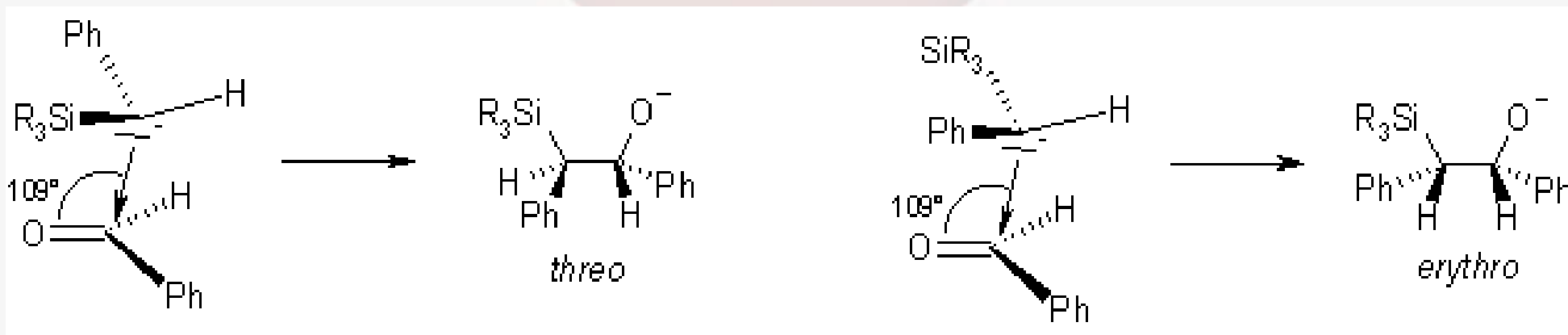
Acidic elimination

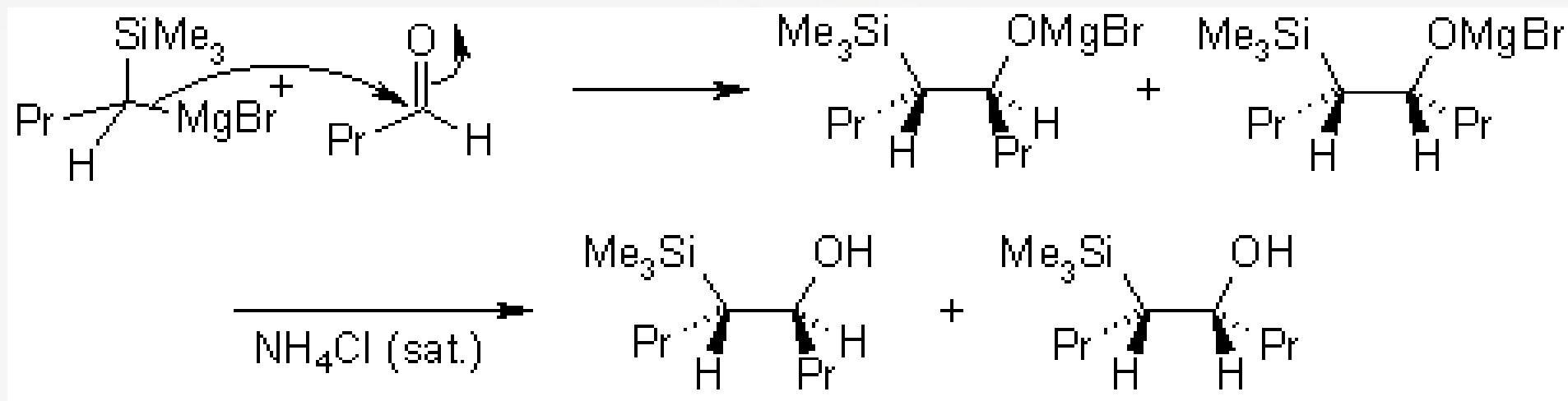
The treatment of the β -hydroxysilane (**1**) with acid results in protonation and an *anti* elimination to form the desired alkene.



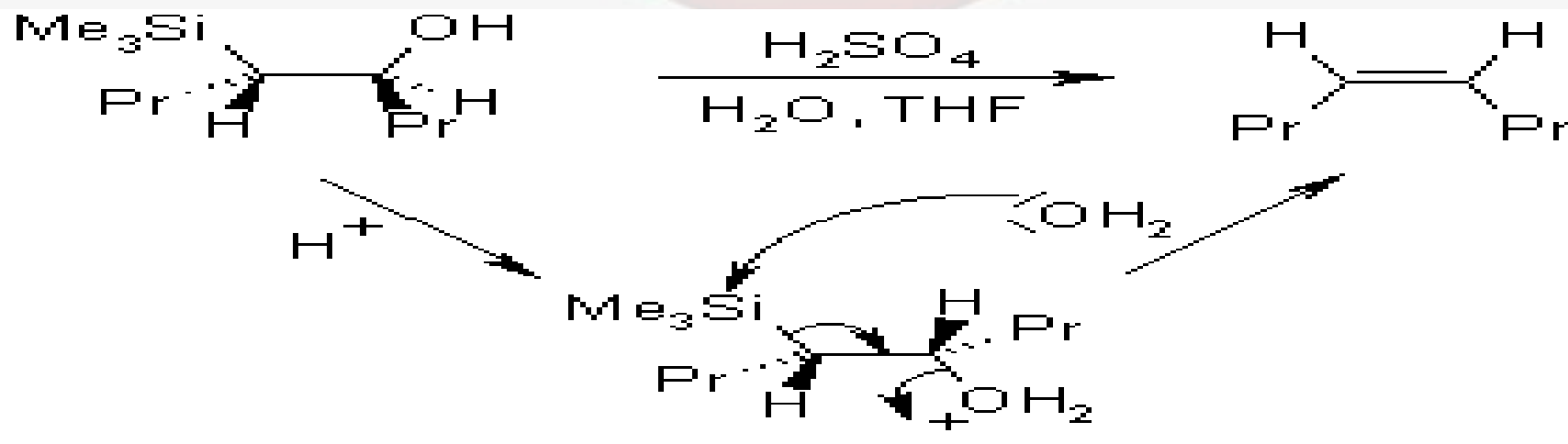
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Some of these reactions are stereoselective and may be rationalized with simple models: The reaction of benzaldehyde and a silylcarbanion gives the *threo*-product if the silyl group is small. This implies that in the transition state, the two sterically demanding groups are *anti*. As the silyl group becomes more sterically demanding than trimethylsilyl, the selectivity shifts towards the *erythro*-isomer.





Acidic hydrolysis proceeds via an *anti*-elimination

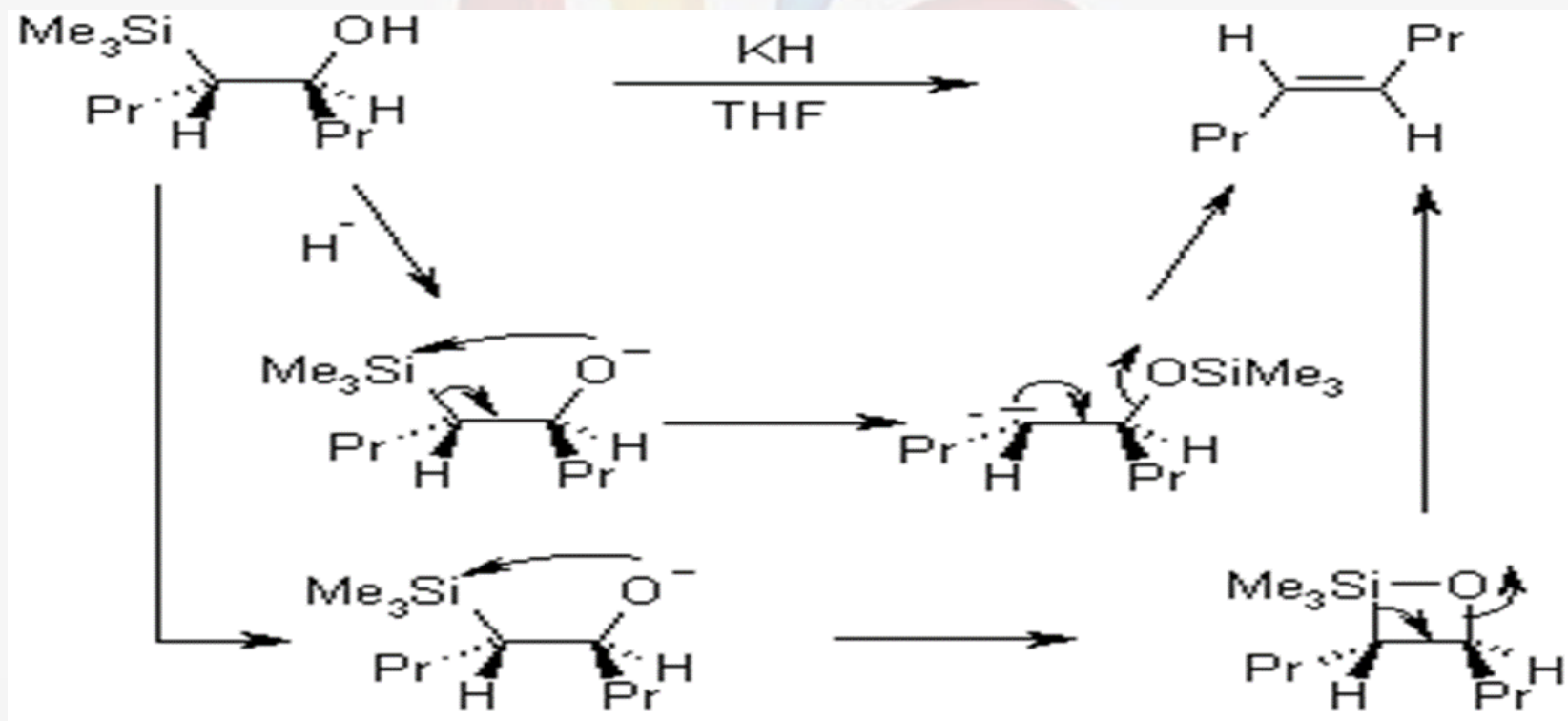


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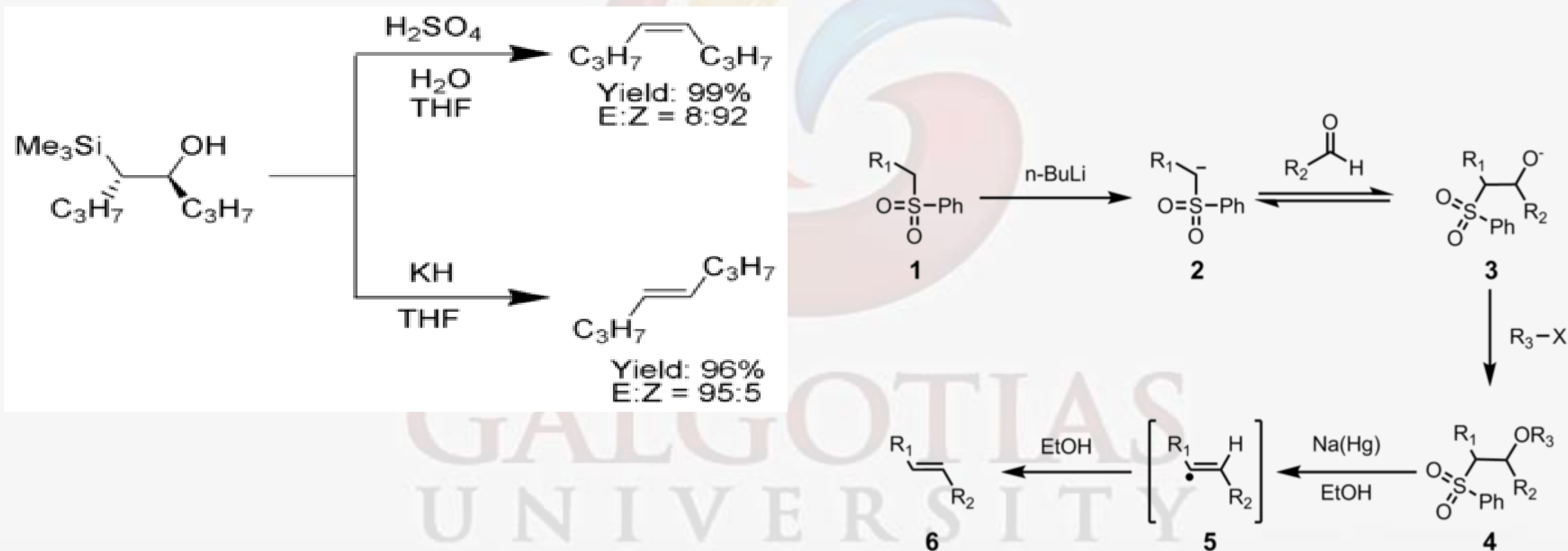
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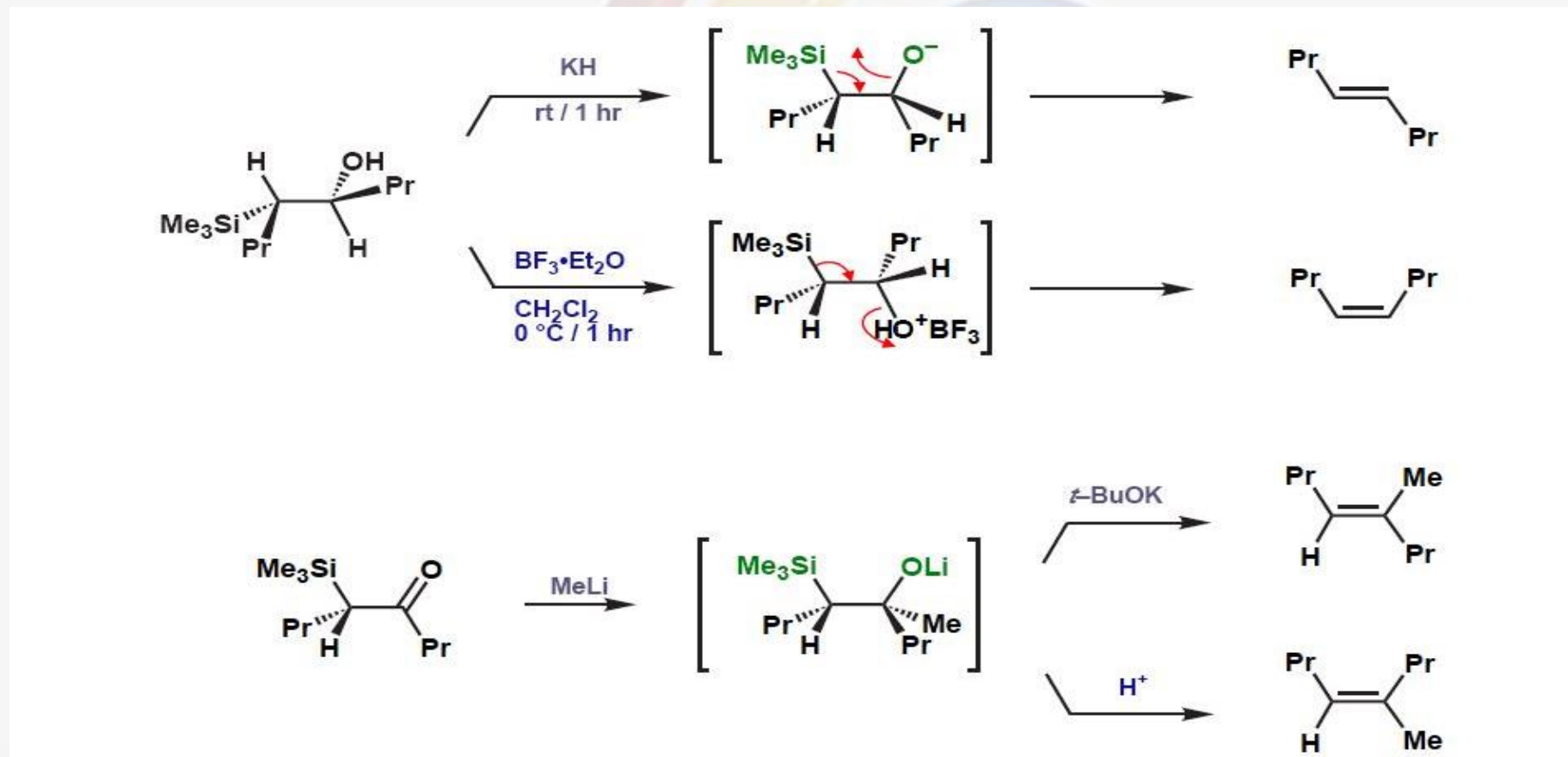
In contrast, the base-catalyzed elimination may proceed via a 1,3-shift of the silyl group after deprotonation, or with the formation of a pentacoordinate 1,2-oxasiletanide that subsequently undergoes cycloreversion:



Examples



Examples



References

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- T.L. Gilchrist, Heterocyclic Chemistry, 3rd edition, Addison-Wesley Longman Ltd., England, 1997.
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