

# Nucleophilic substitution reaction

$S_N2$

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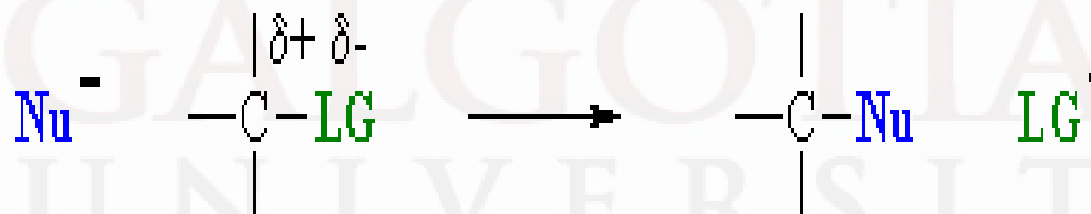
## Nucleophilic substitution

In Nucleophilic Substitution reaction the replacement of one group by another is called substitution reaction. There are three main types of these reactions: radical, electrophilic and nucleophilic substitution. In this section we will deal with nucleophilic substitution at saturated carbon atom.

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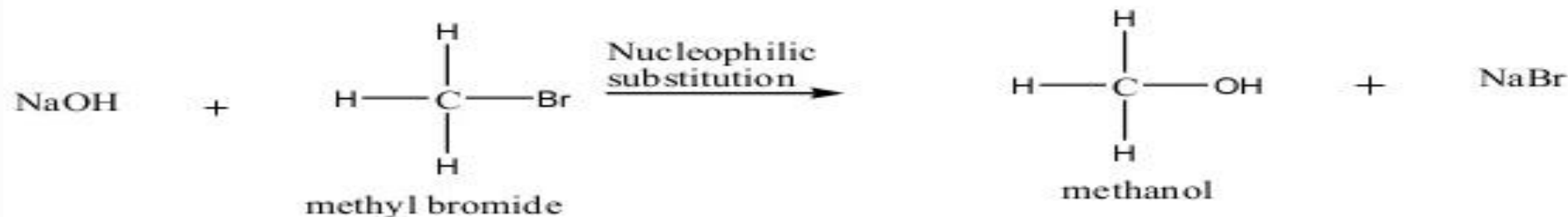
## Nucleophilic substitution

- ❖ There are two fundamental events in a nucleophilic substitution reaction:
  - formation of the new  $\sigma$  bond to the nucleophile
  - breaking of the  $\sigma$  bond to the leaving group
- ❖ Depending on the relative timing of these events, two different mechanisms are possible:
  - Bond breaking to form a carbocation precedes the formation of the new bond :  $S_N1$  reaction
  - Simultaneous bond formation and bond breaking :  $S_N2$  reaction



## $S_N2$ : bimolecular Nucleophilic Substitution

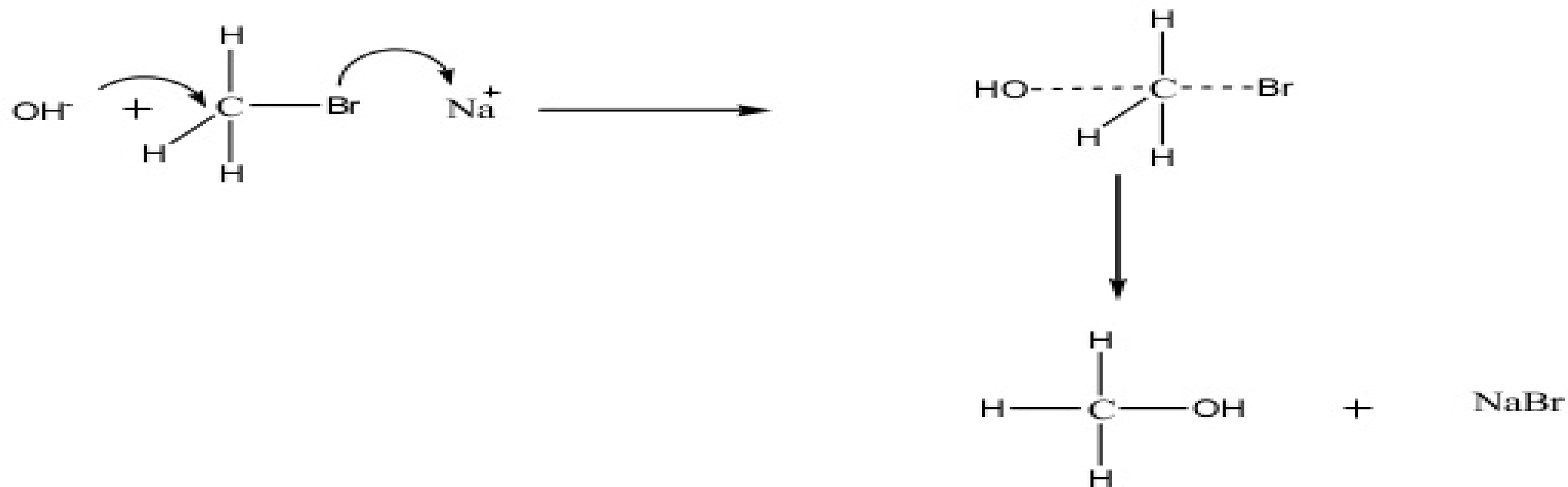
- It is concerted process, bond breaking and bond formation takes place simultaneously
- This type of reaction is classified as bimolecular because the alkyl halide and nucleophile are involved in rate determining step.
- Rate:  $k[\text{alkyl halide}][\text{Nucleophile}]$



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## Mechanism of $S_N2$

1. The nucleophile attacks the reactive centre from the opposite side of leaving group, Backside attack by nucleophile.
2.  $S_N2$  reaction is driven by the attraction between negative charge of nucleophile and positive charge on leaving group.



**Source & References:**

*The materials presented in this lecture has been taken from various books and internet websites. This instruction materials is for instructional purposes only.*

1. <https://pt.slideshare.net/SheamaT/nucleophilic-substitution-reactions>
2. <https://www.slideshare.net/ganeshmote1/alkyl-halide-131723782>
3. <http://www.chem.ucalgary.ca/courses/350/Carey5th/Ch08/ch8-1.html>

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# School of Basic and Applied Sciences

Course Code : BSCC2004

Course Name: Organic Chemistry-II

**Thank You.....**

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