

SUBSTITUTION REACTION (SN_1)



Black cat waits for the brown cat to leave and then takes the pod. Similarly in SN_1 reaction one nucleophile waits for other nucleophile to move from substrate.

WHAT IS SN_1 REACTION ?

SN_1 indicates the **unimolecular nucleophilic substitution** reaction in organic chemistry. Their **rate determining step** of the mechanism depends on the decomposition of a single molecular species. So that, the rate of a SN_1 reaction can be expressed as **rate = k [R-LG]**. Furthermore, SN_1 is a **multi-step** reaction, which forms an intermediate and several transition states during the reaction. This intermediate is a more stable carbocation and the reactivity of the molecule depends on the **R-group**.

SN_1 MECHANISM ($R-OH \rightarrow R-X$)

PROTON TRANSFER



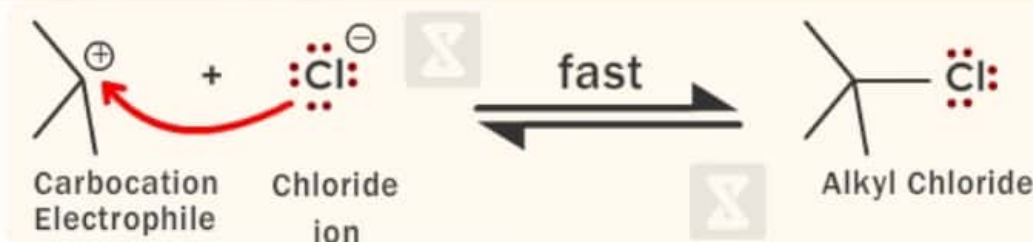
DISSOCIATION OF WATER



RATE - DETERMINING STEP

- Unimolecular
- Nucleophilic reaction
- " SN_1 " mechanism

CAPTURE OF CARBOCATION



Protic solvent



3° or 2° carbon



1° carbon



SUBSTITUTION REACTION (SN₂)

Part II



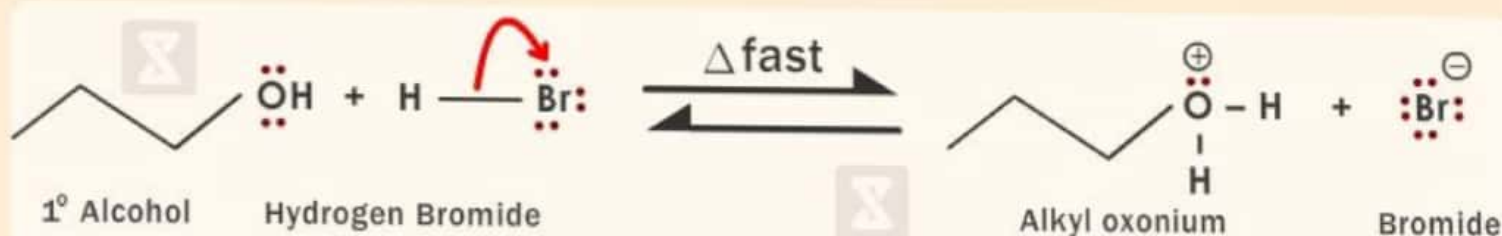
Black cat forces the brown cat out from the pod. Similarly in SN₂, strong nucleophile kicks out the weaker nucleophile.

WHAT IS SN₂ REACTION?

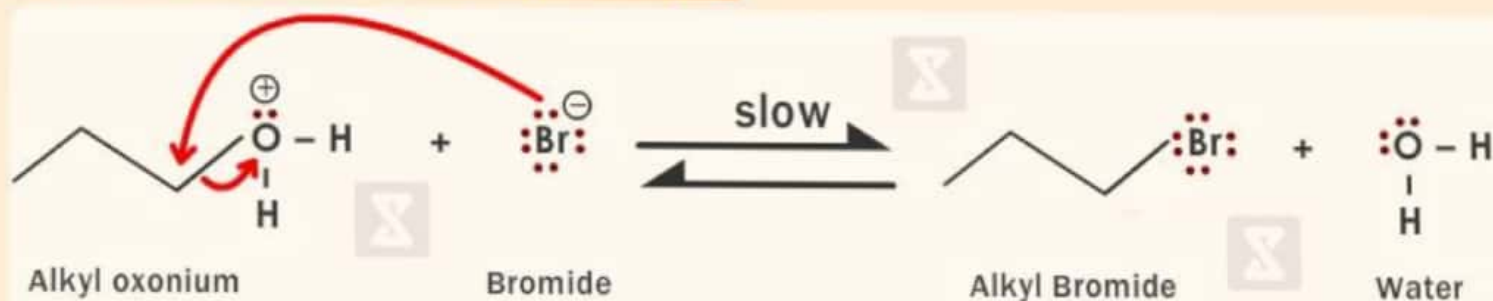
SN₂ indicates the **bimolecular nucleophilic substitution** reaction in organic chemistry. In this mechanism, separation of leaving group and formation of new bond happen synchronously. Therefore, two molecular species are involved in the rate determining step and this leads to the term bimolecular nucleophilic substitution reaction or SN₂. The rate of the SN₂ reaction can be expressed as $\text{rate} = k [\text{R-LG}] [\text{Nu}^-]$. In inorganic chemistry, this reaction is also called **associative substitution** or **interchange mechanism**.

SN₂ MECHANISM (R - OH → R - X)

PROTONATE ALCOHOL



NUCLEOPHILE (HALIDE) SEPERATES WATER



Here, nucleophile attacks from the opposite direction of the leaving group. Thus, SN₂ reaction always leads to an **inversion of stereochemistry**. This reaction works best **with methyl and primary halides** because bulky alkyl groups block the backside attack of the nucleophile. In addition, the stability of the leaving group as an anion and the strength of its bond to the carbon atom both affect the rate of reaction.



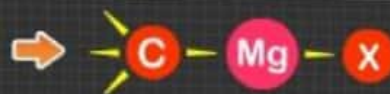
GRIGNARD REAGENT

WHAT IS GRIGNARD REAGENT?



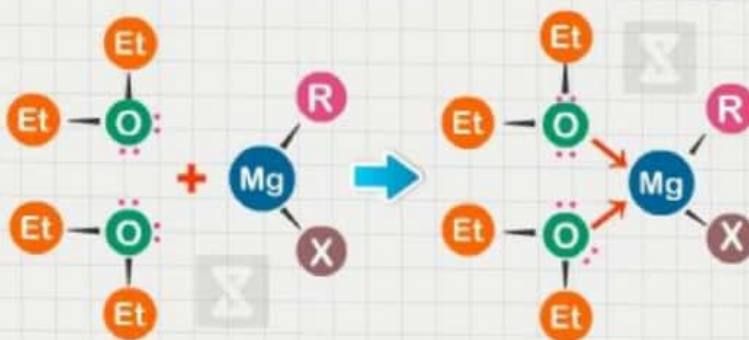
→ If the metal attached to the carbon is Magnesium, then it is called Grignard Reagent.

→ Victor Grignard first synthesized this compound.



WHY GRIGNARD REAGENT IS PLACED IN DRY ETHER ?

Ether provides stability to Grignard reagent by completing the octet on Mg.



WHAT ARE ORGANO METALLICS ?

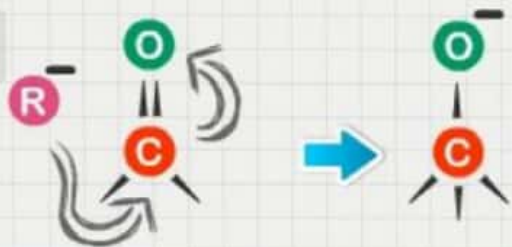
Organo metallic compounds are organic compounds in which metal atom is directly attached to Carbon atom



CHEMICAL REACTIVITY OF GRIGNARD REAGENT

Grignard reagent produces nucleophile therefore it attacks at electrophilic centers

ATTACK ON ALDEHYDES



ATTACK ON ALKYNES



REACTIVITY

Carbon has high electronegativity than Mg.
So on breaking this bond Produces a C^- nucleophile

