Part I

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 ⟶ 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 (SN_2)

Part II

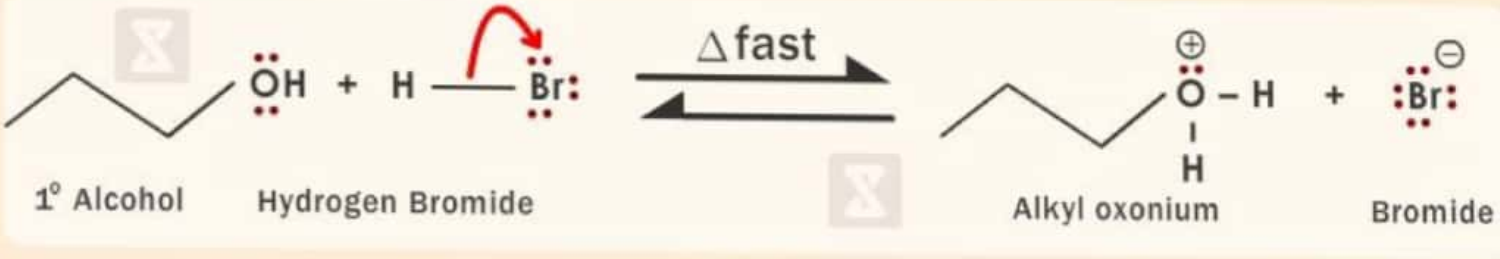
Black cat forces the brown cat out from the pod. Similarly in SN_2, strong nucleophile kicks out the weaker nucleophile.

WHAT IS SN_2 REACTION?

SN_2 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 involve in the rate determining step and this leads to the term bimolecular nucleophilic substitution reaction or SN_2. The rate of the SN_2 reaction can be expressed as rate = K [R-LG] [Nu−]. In inorganic chemistry, this reaction is also called associative substitution or interchange mechanism.

SN_2 MECHANISM (R – OH ⟶ R – X)

PROTONATE ALCOHOL



1° Alcohol | Hydrogen Bromide | Alkyl oxonium | Bromide

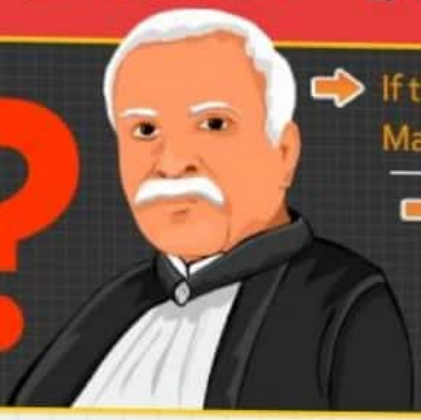
NUCLEOPHILE (HALIDE) SEPERATES WATER

Alkyl oxonium | Bromide | Alkyl Bromide | Water

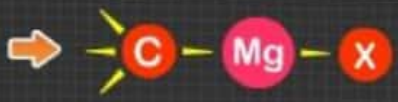
Here, nucleophile attacks from the opposite direction of the leaving group. Thus, SN_2 reaction always leads to an inversion of stereochemistry. This reaction works best with methyl and primary halides because bulky alkyl groups block the backside attack of the nucleophile. In addition, the stability 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?

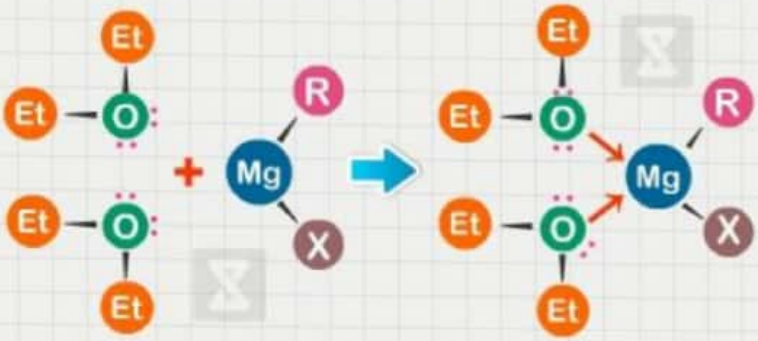


- If the metal attached to the carbon is Magnesium, then it is called Grignard Reagent.
- Victor Grignard first synthesized this compound.



WHY GRIGNARD REAGENT IS PLACED IN DRY ETHER ?

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



WHAT ARE ORGANO METALLICS ?

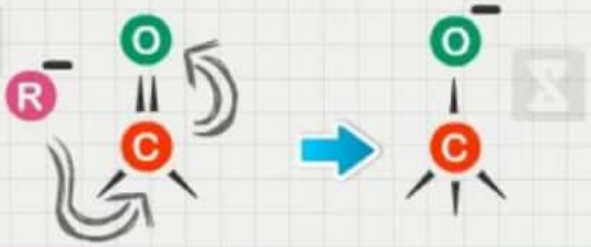
Organo metallic compounds are organic compounds in which metal atom is directly attached to Carbon atom

M — C

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

$\delta-$ $\delta+$
C – Mg