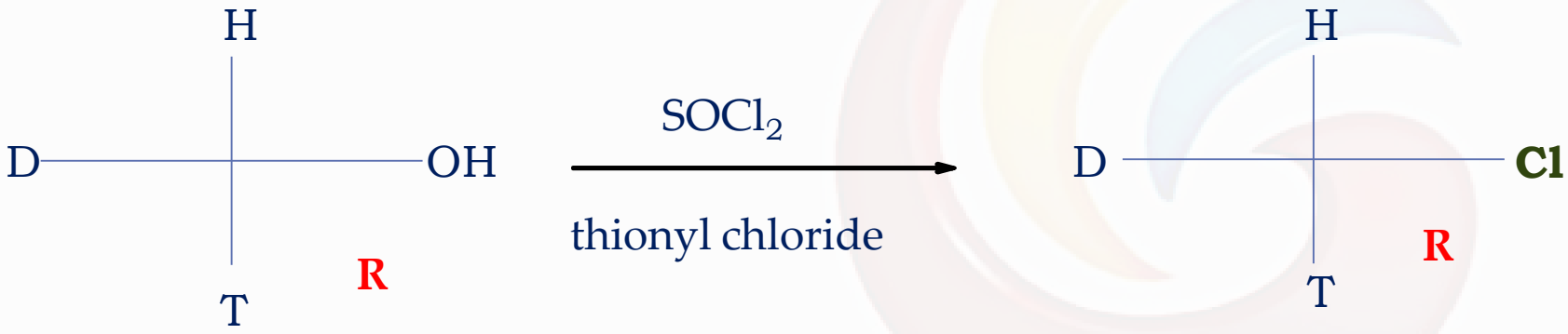
Nucleophilic substitution reaction

S_Ni

Nucleophilic Substitution SN^i

This kind of reaction is seen only in one situation.

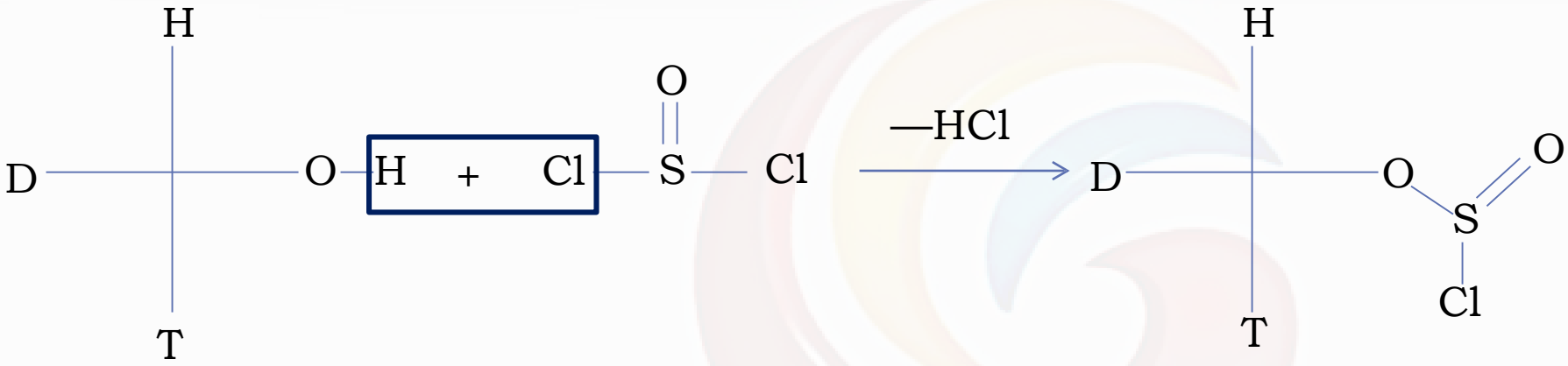


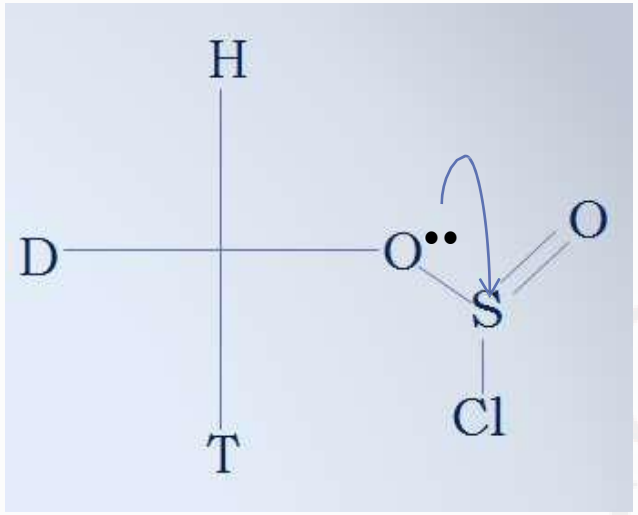
So, in SN^i reactions, we have **retention of configuration.**
But this is different from SN^1 reactions as there is no formation of a racemic mixture over here.

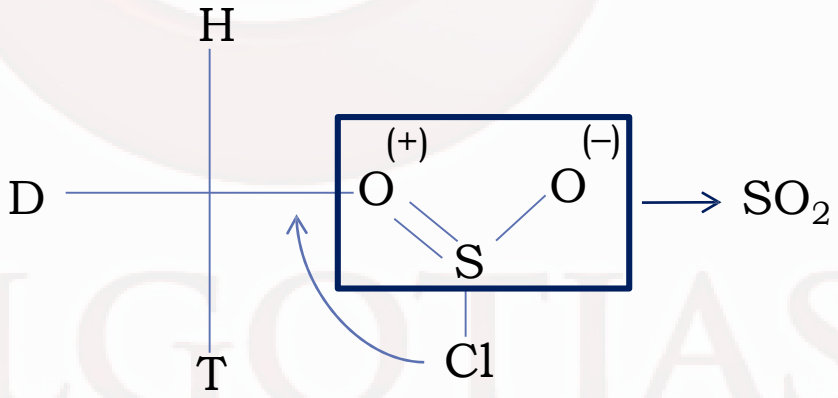
This is also different from SN^2 reactions as in SN^2, there is inversion of configuration, whereas over here, the stereochemistry of the reactant and the product is nearly the same.

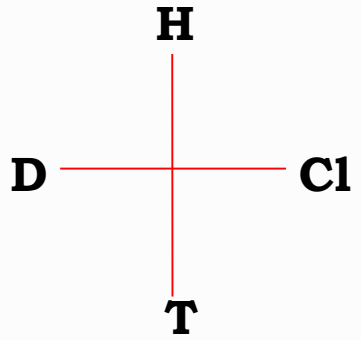
Hence this reaction can be explained **neither by SN^1 nor by SN^2.**

Nucleophilic Substitution Internal



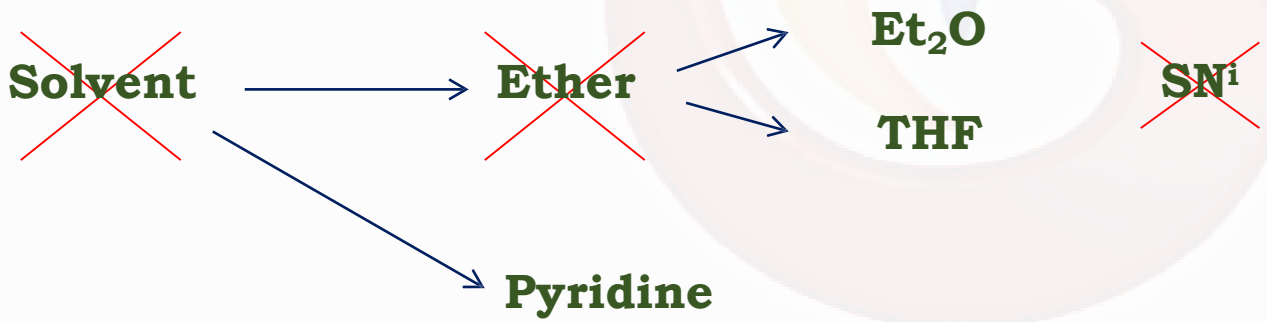




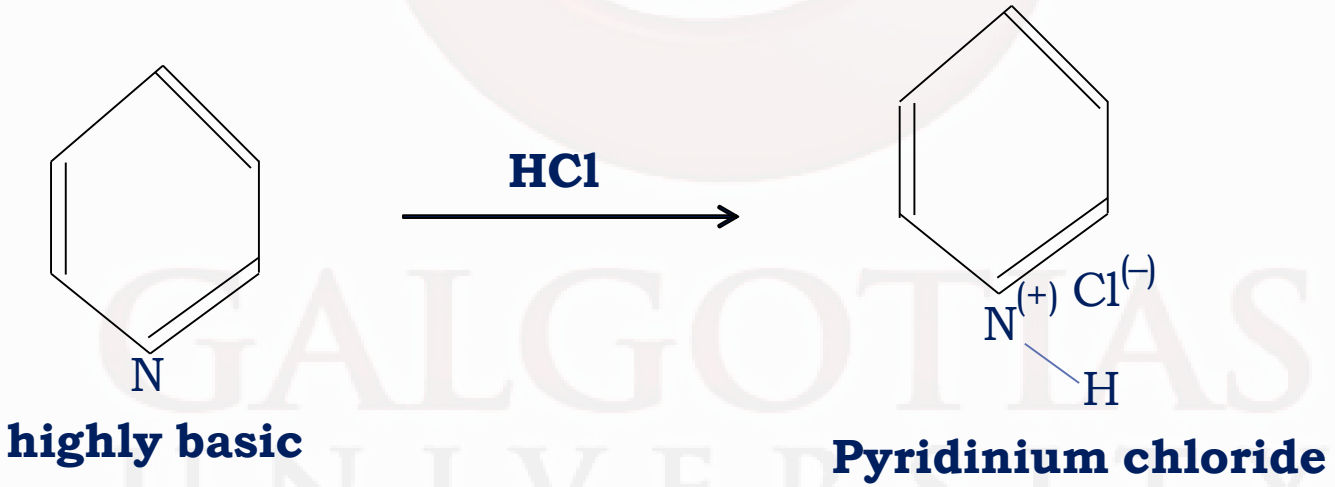


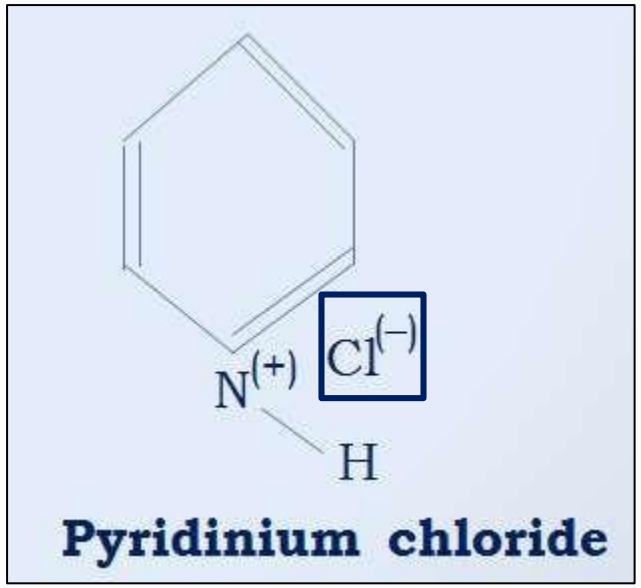
Alkyl chloride:

We conclude that in SN^i reactions, we get a **retention of configuration.**

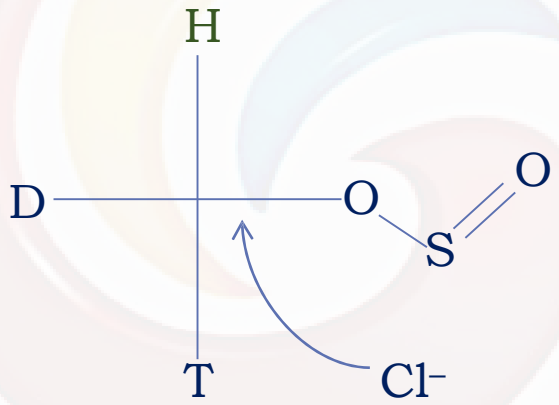


- The principle mechanism of SN^i reactions is based on the assumption that addition of pyridine to the reaction leads to **inversion of configuration.**





- **Cl^-** ion is **loosely bonded** and **free**



- Hence there is backward attack which results in **inversion** of configuration.

Hence if the solvent added in the medium of this reaction is pyridine,

then the reaction will **no longer remain SN^i** as the mechanism will change to that of **SN^2.**

Hence, we can draw **four** important inferences:

1. In ether medium, the reaction follows the rules of **SN^i** mechanism.

2. If pyridine is added as the medium solvent to this reaction, it will form a strong **nucleophile** in Pyridinium chloride, which will cause a **backward** attack on the system, eliminating Sulphur dioxide from it.

3. This type of reaction will be termed as SN^2 because there is **inversion** of configuration. In case of pyridine, the nature of the reaction changes from **SN^i** to **SN^2.**

4. In case of SN^i reactions, the rate of the reaction is dependent on the concentration of both the alcohol and the thionyl chloride, i.e.,

$$\text{Rate } \mathbf{r} = [\mathbf{R-OH}]\,[\mathbf{SOCl_2}],$$

as opposed to the case of SN^1 and SN^2 reactions.

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.

a. https://www.slideshare.net/born2beawinner/sni-substitution-reactions

b. https://www.slideshare.net/ganeshmote1/alkyl-halide-131723782

Thank You.....