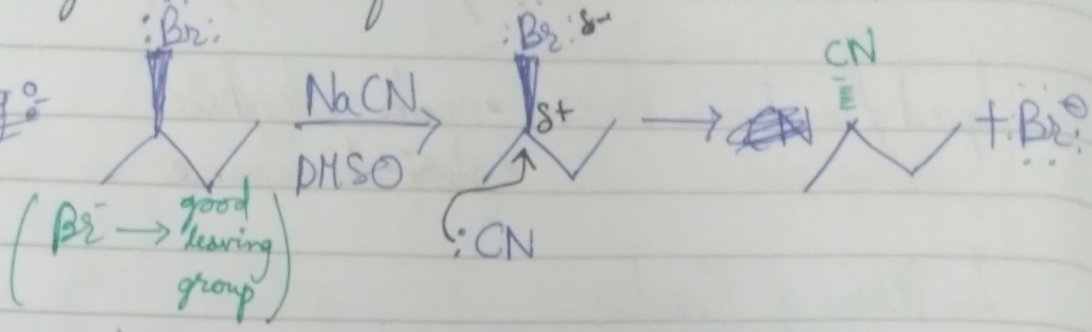
Reactions: In SN^2 reactions, a catalyst like H^+ is not required. This is because, the nucleophile attacks the molecule directly.

There is no need for a catalyst as the nucleophile's strength is what influences SN^2 reaction

Mechanism: Eg:



Here, $NaCN \longrightarrow Na^+ + CN^-$

strong nucleophile

DMSO → Polar Aprotic solvent

From above reaction,
The nucleophile CN attacks the molecule on rear side

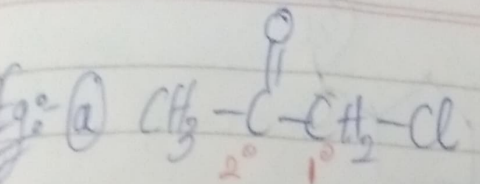
∴ The Backside of the molecule is attacked, it causes an inversion of the molecule after the leaving group leaves & nucleophile gets attached

This Inversion is called Walden Inversion

Steric Hinderance:

However, Transition State's Stability is also influenced by Steric Hinderance

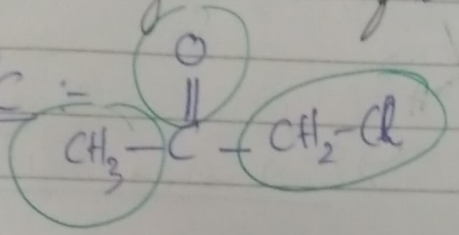
It is the amount of bulky groups surrounding C which cause difficulty for nucleophile to attack.

Eg: (a) 

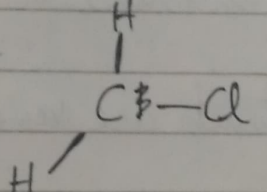
Here, the 1°C is the one with the Lg [leaving group]
2°C is the next carbon

Now generally, $3^\circ > 2^\circ > 1^\circ$ ← Stability

But, for a nucleophile to attack molecule, it can only attack if there is less opposition

At 2°C :-  3 bulky groups

∴ Nucleophile will be less favourable to attacks at 2°C position

But At 1°C :-  Not much bulky groups (more space)

∴ Nucleophile will be more favourable to attack at 1°C position

∴ Steric hinderance is less when there is lesser bulkier groups attached to carbon.

∴ For SN^2 = $1^\circ > 2^\circ > 3^\circ$ [Steric
← Steric hinderance decreases

∴ 1°C is most favoured by nucleophiles
In 2° & 3°C, steric hinderance increases

$$\text{Steric Hinderance} \propto \frac{1}{SN^2}$$