AXIS BANK

DATE: _____

Nucleophilic Substitution Reaction

When substitution reaction involve the attack by a nucleophile the reaction is nucleophilic substitution reaction (SN). e.g. hydrolysis of alkyl halide by aq NaOH.

$$R-X + \bar{O}H \longrightarrow R-OH + X^-$$

They are devided into two classes :-

1. S_N1 Reaction – Unimolecular nucleophilic substitution reaction. The rate of nucleophilic substitution reaction depends only on the concentration of alkyl halide. The reaction is first order and is represented by S_N1.

$$R \propto [\text{Substrate}]$$

Hydrolysis of tert-butyl bromide. The reacti

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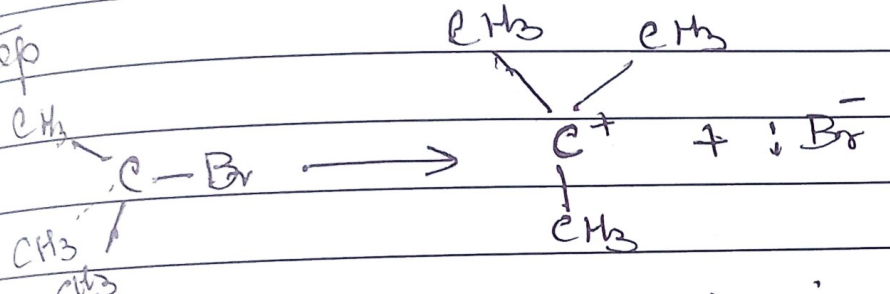
Reaction of two steps

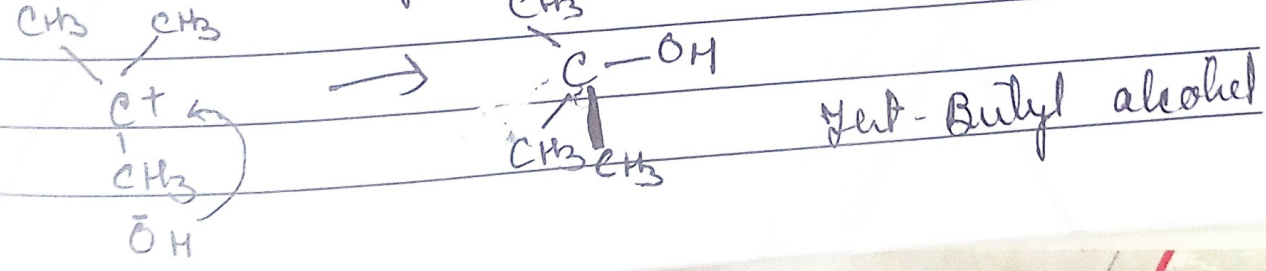
Step 1 – The alkyl halide ionises to give carbanion ion. This is the rate determining step



tert Butyl bromide

The carbanion ion is planer because the central positively charge carbon atom is sp^2 hybridized.

Step II – The nucleophile can attack the planer carbanion ion from either side to give tert-butyl alcohol



Tert-Butyl alcohol

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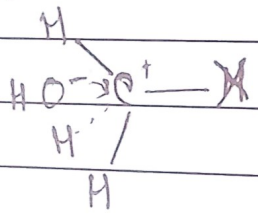
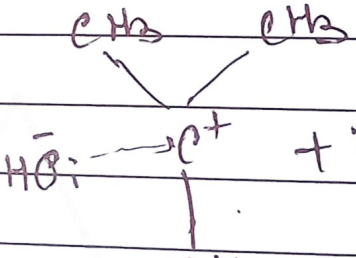
The primary alkyl halide undergo hydrolysis by S_N2 machanism. The tert alkyl haliole undergo hydrolysis by S_N1 mechanism. Because the attack of OH^- on the crowded tert alkyl haliole is quite difficult.



Easy attack Pr. bromide



Difficult to attack ~~Carbain ion~~ tert halide

Secondary haliole may undergo hydrolysis either S_N1 or S_N2 mechanism