$S_N^1$ mechanism (S: substitution, N: nucleophilic, 1: first order) is one of the two limiting mechanisms of nucleophilic aliphatic substitution at saturated carbon. It is a two-step mechanism:

**Step 1:**

\[
\begin{align*}
R -& \quad \overset{L}{\longrightarrow} \\
& \quad \text{substrate} \\
& \quad \text{Nucleophile} \\
& \quad \text{Carbocation} \\
& \quad \text{Leaving group} \\
& \quad \overset{+}{\longrightarrow} \\
R^+ + & \quad \overset{L^-}{\longrightarrow} \\
& \quad \text{Product}
\end{align*}
\]

A nucleophilic aliphatic substitution at saturated carbon occurring via $S_N^1$ mechanism is called an $S_N^1$ reaction. The rate law of an $S_N^1$ reaction is

\[\text{rate} = k \text{[substrate]}\]

According to the rate law, an $S_N^1$ reaction is first order overall, and the concentration of the nucleophile does not affect the rate. The implication is that the nucleophile does not participate in the rate limiting step or any prior steps, which suggests that the first step is the rate limiting step. Since the nucleophile is not involved in the rate-limiting first step, the nature of the nucleophile does not affect the rate of an $S_N^1$ reaction.

**See also** $S_N^2$ mechanism

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**Contributors**

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