Steric hindrance at a given atom in a molecule is the congestion caused by the physical presence of the surrounding ligands, which may slow down or prevent reactions at the atom.

eg. 1:

\[
\begin{align*}
\text{H} & \quad \text{CH}_3 \\
\text{C} &= \text{O} \\
\text{H} \\
\text{1} & \quad \text{2}
\end{align*}
\]

In 1, the carbonyl carbon is bonded to two hydrogen atoms. In 2, it is bonded to a hydrogen atom and a methyl group. Since the methyl group is larger than the hydrogen atom, steric hindrance is greater at the carbonyl carbon in 2 than that in 1.

eg. 2:

\[
\begin{align*}
\text{N} & \quad \text{N} \\
\text{H} & \quad \text{CH}_3 \\
\text{H} & \quad \text{CH}_3 \\
\text{H} & \quad \text{CH}_3 \\
\text{1} & \quad \text{2}
\end{align*}
\]

In 1, the nitrogen atom is bonded to three hydrogen atoms; in 2, it is bonded to three methyl groups. A methyl group is larger than a hydrogen atom. Thus, the steric hindrance at the nitrogen atom in 2 is greater than that in 1.

eg. 3:

\[
\begin{align*}
\text{H} & \quad \text{CH}_2\text{CH}_3 \\
\text{C} & \quad \text{C} \\
\text{1} & \quad \text{2} \\
\text{H} & \quad \text{CH}_2\text{CH}_3
\end{align*}
\]

In 3, C\textsubscript{1} is doubly bonded to a carbon atom and singly bonded to two hydrogen atoms, whereas C\textsubscript{2} is doubly bonded to a carbon atom and singly bonded to two ethyl groups. An ethyl group is larger than a hydrogen atom. Thus, the steric hindrance at C\textsubscript{2} is greater than that at C\textsubscript{1}.

• see also steric strain
Contributors and Attributions

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