Benzylic Bromination

Reaction:

\[
\text{Br}_2 \text{ (low concentrations) / light or NBS with light or NBS with heat and peroxides}
\]

Mechanism:

Initiation

\[
\text{Br} \rightarrow \text{Br} \xrightarrow{h\nu} 2 \cdot \text{Br}^-
\]

Propagation

\[
\text{H} \xrightarrow{\cdot} \text{C} \xrightarrow{\cdot} \text{H} + 2 \cdot \text{Br}^-
\]

Termination

\[
2 \cdot \text{Br}^- \rightarrow \text{Br}_2
\]

Among other products.
The mechanism is a radical process. It is crucial that the concentration of Br$_2$ is kept low. Large amounts of Br$_2$ favor addition to the double bond. The use of N-Bromosuccinimide (NBS) is ideal because it is insoluble in CCl$_4$ and only small amounts can react at a time. See mechanism below.

\[
\begin{align*}
\text{Br}_2 + \text{C}_6\text{H}_5\text{C} &= \text{HBr} + \text{C}_6\text{H}_5\text{H} \\
\end{align*}
\]

R = benzene

Under conditions where peroxides are used along with NBS the mechanism is slightly different.
$R' = \text{benzene}$