An active methylene compound is a compound that has the following general structural formula.

\[
\begin{array}{c}
\text{H} \\
\text{H}
\end{array}
\quad
\begin{array}{c}
\text{\textit{E}^1} \\
\text{\textit{E}^2}
\end{array}
\quad
\begin{array}{c}
\text{H} \\
\text{H}
\end{array}
\]

\textit{E}_1, \textit{E}_2 = \text{a functional group that withdraws electrons by resonance}

eg:

\[
\begin{align*}
& \text{H} - \text{C} = \text{O} & \quad & \text{H} - \text{C} = \text{O} \\
& \text{H} - \text{C} = \text{O} & \quad & \text{H} - \text{C} = \text{O}_\text{i} \\
& \text{H} - \text{C} = \text{O}_\text{i} & \quad & \text{H} - \text{C} = \text{O} \\
& \text{H} - \text{C} = \text{N} & \quad & \text{H} - \text{C} = \text{O}
\end{align*}
\]

The conjugate base of an active methylene compound is highly resonance stabilized.

eg:
Consequently, active methylene compounds are highly acidic and can be deprotonated, for all practical purposes, irreversibly, using common strong bases, such as the hydroxide ion or alkoxide ions.

\[
\text{compound} + \text{OH}^- \rightarrow \text{compound}^- + \text{H}_2\text{O}
\]

<table>
<thead>
<tr>
<th>compound</th>
<th>$pK_a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>water</td>
<td>16</td>
</tr>
</tbody>
</table>

equilibrium constant, $K = \frac{10^{-pK_a(1)}}{10^{-pK_a(\text{H}_2\text{O})}}$

$= \frac{10^{-9}}{10^{-16}}$

$= 10^7$

Notice that the equilibrium constant, $K$, is very large.

\[
\text{before reaction:} \quad \text{mol} \quad \text{mol} \quad 0 \quad 0
\]

\[
\text{after reaction:} \quad -x \quad -x \quad -x \quad -x
\]