

**Reactions of Alkynes:** The reactions of alkynes closely parallel the reactions of [alkenes](#). In these reactions, the C≡C triple bond is converted into a C=C double bond. The alkenes formed from these reactions can further to produce alkane derivatives.

Type	Reaction
Halogenation (X = Cl, Br)	$\text{CH}_3\text{—C}\equiv\text{C—H} \xrightarrow{\text{X}_2} \begin{array}{c} \text{CH}_3 \quad \text{X} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{X} \quad \text{H} \end{array} \xrightarrow{\text{X}_2} \begin{array}{c} \text{X} \quad \text{X} \\   \quad   \\ \text{CH}_3\text{—C—C—H} \\   \quad   \\ \text{X} \quad \text{X} \end{array}$
Hydrohalogenation (X = Cl, Br, I)	$\text{CH}_3\text{—C}\equiv\text{C—H} \xrightarrow{\text{HX}} \begin{array}{c} \text{CH}_3 \quad \text{H} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{X} \quad \text{H} \end{array} \xrightarrow{\text{HX}} \begin{array}{c} \text{X} \quad \text{H} \\   \quad   \\ \text{CH}_3\text{—C—C—H} \\   \quad   \\ \text{X} \quad \text{H} \end{array}$
Hydrogenation	$\text{CH}_3\text{—C}\equiv\text{C—CH}_3 \xrightarrow[\text{PtO}_2 \text{ or Pd/C}]{\text{H}_2} \begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H} \quad \text{H} \end{array} \xrightarrow[\text{PtO}_2 \text{ or Pd/C}]{\text{H}_2} \begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{CH}_3\text{—C—C—CH}_3 \\   \quad   \\ \text{H} \quad \text{H} \end{array}$
	$\text{CH}_3\text{—C}\equiv\text{C—CH}_3 \xrightarrow[\text{Lindlar catalyst}]{\text{H}_2} \begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H} \quad \text{H} \end{array}$
	$\text{CH}_3\text{—C}\equiv\text{C—CH}_3 \xrightarrow{\text{Li, NH}_3} \begin{array}{c} \text{CH}_3 \quad \text{H} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H} \quad \text{CH}_3 \end{array}$
Hydration	$\text{CH}_3\text{—C}\equiv\text{C—H} \xrightarrow[\text{HgSO}_4]{\text{H}_2\text{SO}_4, \text{H}_2\text{O}} \left[ \begin{array}{c} \text{OH} \quad \text{H} \\   \quad   \\ \text{CH}_3\text{—C}=\text{C—H} \end{array} \right] \longrightarrow \begin{array}{c} \text{O} \quad \text{H} \\    \quad   \\ \text{CH}_3\text{—C—C—H} \\   \\ \text{H} \end{array}$
	$\text{CH}_3\text{—C}\equiv\text{C—H} \xrightarrow[2) \text{H}_2\text{O}_2, \text{OH}^-, \text{H}_2\text{O}]{1) \text{BH}_3, \text{THF}} \begin{array}{c} \text{H} \quad \text{O} \\   \quad    \\ \text{CH}_3\text{—C—C—H} \\   \\ \text{H} \end{array}$
Acidity of Terminal Alkynes	$\text{CH}_3\text{—C}\equiv\text{C—H} \xrightarrow[\text{NH}_3]{\text{NaNH}_2} \text{CH}_3\text{—C}\equiv\text{C:}^\ominus \xrightarrow{\text{RCH}_2\text{X}} \begin{array}{c} \text{H} \\   \\ \text{CH}_3\text{—C}\equiv\text{C—C—R} \\   \\ \text{H} \end{array}$
Oxidative Cleavage	$\text{CH}_3\text{—C}\equiv\text{C—H} \xrightarrow[\text{H}_3\text{O}^+]{\text{KMnO}_4} \text{CH}_3\text{—C}(=\text{O})\text{—OH} + \text{CO}_2$ <p style="text-align: center;">Also works with Ozone – alkynes give acids only.</p>