**References:**


**Natural reaction:**

Used mainly in plants, cyanide serves as both a defense against predators and a nitrogen source for metabolic purposes. Cyanide is stored as part of a cyanohydrin, and hydroxynitrile lyases are responsible for releasing cyanide as needed.

**Mechanism:**

Around 5 different families of hydroxynitrile lyases have evolved convergently, and the exact amino acid residues used in catalysis differ; however, there is a common mechanistic requirement for general acids and bases to assist cyanohydrin formation / cleavage.

**Disconnection:**

Running the natural reaction in reverse to provide enantioenriched nitriles is the major use for hydroxynitrile lyases in biocatalysis.

**Application in biocatalysis:**

The enantio-enriched nitriles afforded by hydroxynitrile lyases are typically further modified, as the cyanohydrin functional group is only moderately stable.

**Examples:**

Mutation of a *Prunus amygdalus* hydroxynitrile lyase improved both enzyme throughput and stability at lower pH, transforming this into an industrially important catalyst.


Another example of using mutant hydroxynitrile lyases industrially is the production of a key intermediate in many anti-hypertension drugs, the angiotensin-converting enzyme inhibitors.


Although rare, some examples exist in which the nitrile in the product is left intact, such as in the production of (S)-3-phenoxymethylbenzaldehyde - a key intermediate for a class of synthetic insecticides.

Gruber, K. *Chem. Rev.* 2011, 111, 4346

**Examples (Continued):**

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