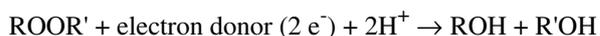


Peroxidase

| Peroxidase | |
|--|---|
|  | |
| Glutathione Peroxidase 1 | |
| Identifiers | |
| Symbol | peroxidase |
| Pfam | PF00141 ^[1] |
| InterPro | IPR002016 ^[2] |
| PROSITE | PDOC00394 ^[3] |
| SCOP | 1hsr ^[4] |
| SUPERFAMILY | 1hsr ^[5] |
| Available protein structures: | |
| Pfam | structures ^[6] |
| PDB | RCSB PDB ^[7] ; PDBe ^[8] |
| PDBsum | structure summary ^[9] |

Peroxidases (EC number 1.11.1.x ^[10]) are a large family of enzymes that typically catalyze a reaction of the form:



For many of these enzymes the optimal substrate is hydrogen peroxide, but others are more active with organic hydroperoxides such as lipid peroxides. Peroxidases can contain a heme cofactor in their active sites, or alternately redox-active cysteine or selenocysteine residues.

The nature of the electron donor is very dependent on the structure of the enzyme.

- For example, horseradish peroxidase can use a variety of organic compounds as electron donors and acceptors. Horseradish peroxidase has an accessible active site, and many compounds can reach the site of the reaction.
- Because there is a very closed active site, for an enzyme such as cytochrome c peroxidase, the compounds that donate electrons are very specific, .

While the exact mechanisms have yet to be elucidated, peroxidases are known to play a part in increasing a plant's defenses against pathogens.^[11] Peroxidases are sometimes used as histological marker. Cytochrome c peroxidase is used as a soluble, easily purified model for cytochrome c oxidase.

The glutathione peroxidase family consists of 8 known human isoforms. Glutathione peroxidases use glutathione as an electron donor and are active with both hydrogen peroxide and organic hydroperoxide substrates. Gpx1, Gpx2, Gpx3, and Gpx4 have been shown to be selenium-containing enzymes, whereas Gpx6 is a selenoprotein in humans with cysteine-containing homologues in rodents.

Amyloid beta, when bound to heme, has been shown to have peroxidase activity.^[12]

A typical group of peroxidases are the haloperoxidases. This group is able to form reactive halogen species and, as a result, natural organohalogen substances.

A majority of peroxidase protein sequences can be found in the PeroxiBase database.

Applications

Peroxidase can be used for treatment of industrial waste waters. For example, phenols, which are important pollutants, can be removed by enzyme-catalyzed polymerization using horseradish peroxidase. Thus phenols are oxidized to phenoxy radicals, which participate in reactions where polymers and oligomers are produced that are less toxic than phenols.

Furthermore, peroxidases can be an alternative option of a number of harsh chemicals, eliminating harsh reaction conditions. There are many investigations about the use of peroxidase in many manufacturing processes like adhesives, computer chips, car parts, and linings of drums and cans.

References

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