

Hydrogenases are microbial enzymes catalyzing reversible oxidation of molecular hydrogen. These enzymes are mostly found in prokaryotes, but a few of them are present in eukaryotes as well. Hydrogenases are metalloproteins which are classified into three classes, [NiFe]-, [FeFe]- and [Fe]-hydrogenases, based on the composition of the active site. [NiFe]-hydrogenases are heterodimeric proteins with the active site localized in the large subunit. [FeFe]-hydrogenases are mostly monomeric and their active site is called H-cluster. Hydrogenases often possess additional domains that contain redox centers, mostly iron-sulfur clusters. Most of the accessory domains of hydrogenases are homologous to other redox complexes, e. g. Complex I of respiratory chain. Maturation of hydrogenases is a complex process involving the activity of several proteins, some of which have been already partially characterized. Compelling evidence indicates that [NiFe]- and [FeFe]-hydrogenases are phylogenetically distinct classes of proteins. This work deals with the differences among hydrogenases including their function, structure, maturation and distribution, and also mentions their similarities with other enzymes.