

Extraordinary Chemistry of Hydrogenase Enzymes and Their Synthetic Models

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Using enzymes called hydrogenases, many organisms, including those inhabiting the human gut, oxidize and produce H_2 . In some respects, these systems exceed platinum as catalysts for transformations relevant to new energy producing systems.

The truly transformational aspect of the hydrogenases is that they operate by extraordinary mechanisms, mechanisms that are not found in classical organometallic chemistry. Some of these extraordinary aspects include *proton relays*, *mixed valence hydrides*, and *proton-coupled electron transfer*. Additionally these catalytic centers consist of Fe-S-CO ensembles, components that previously would have been considered poisonous for catalysts. This lecture will describe the behavior of the active sites of these enzymes and their synthetic analogues (see graphic).

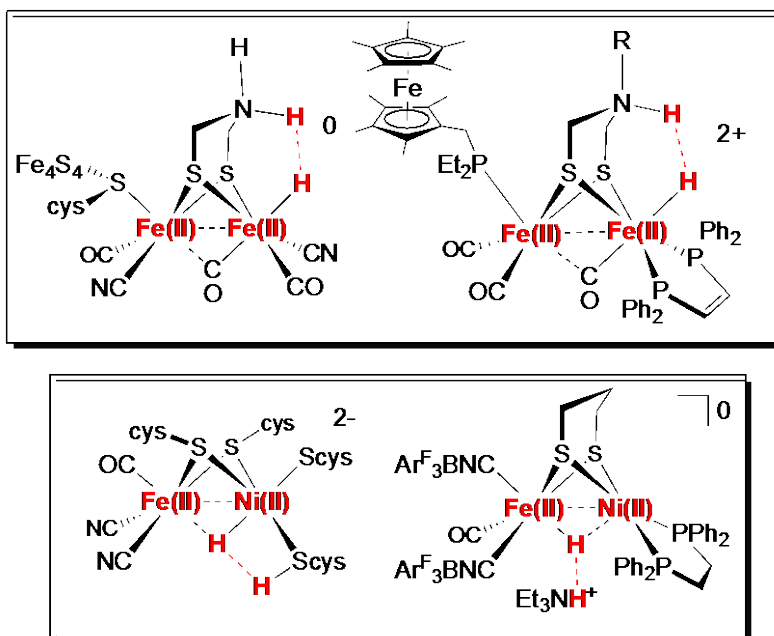


Figure. Active sites (left) and their synthetic analogues (right) for the [FeFe]- and [NiFe]-hydrogenases.

Leading references

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