The Sulfur Oxygenase Reductase from *Acidianus Ambivalens*

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The biological oxidation of elemental sulfur and reduced inorganic sulfur compounds to sulfate is one of the major reactions in the sulfur cycle, in biotechnological processes such as bioleaching of low-grade metal ores, and for life in solfataras and hot springs of volcanic origin. Little is known about the enzyme systems involved in these oxidation pathways, especially "sulfur enzymes" from microorganisms living in acidic and/or hot environments [1]. The cytoplasmatic sulfur oxygenase reductase (SOR) [2] of *Acidianus ambivalens* is the initial enzyme in its aerobic sulfur oxidation pathway. It catalyzes the oxygen-dependent disproportionation of elemental sulfur leading to sulfite, thiosulfate and sulfide. Sulfur is simultaneously electron donor and acceptor of the reaction. The only identified redox-active site in SOR is a low-potential mononuclear non-heme iron center [2]. Three cysteines conserved in all SOR amino acid sequences are also thought to be involved due to the inhibitory effect of thiol-binding compounds [3]. The catalytic reaction is not yet elucidated, as it requires not yet well understood complex redox transitions. The enzyme is a large homo-multimer composed of identical subunits of 308 residues with a diameter of 15.5 nm [2]. SOR was crystallized and its 3D structure determined by MIRAS, showing a 24-oligomer with 432 NCS [4] and 870 kDa.

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