

Anaerobic Sulfatase-Maturing Enzymes

First dual substrate radical *S*-adenosylmethionine enzymes?

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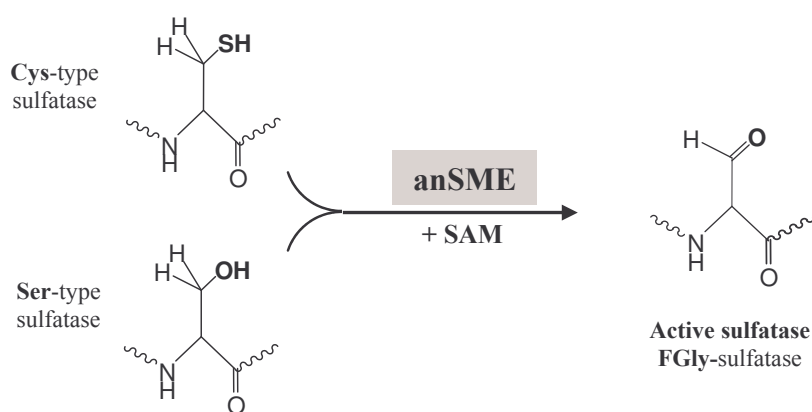
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Sulfatases are widespread enzymes, found from prokaryotes to eukaryotes, and are involved in many biochemical processes. To be active, sulfatases must undergo a unique post-translational modification leading to the conversion of a critical cysteine (in “Cys-type” sulfatases) or serine (in “Ser-type” sulfatases) into a C_α-formylglycine (FGly). To date, two distinct enzymatic systems have been identified for catalyzing this reaction. One is the formylglycine generating enzyme system (FGE), an oxygen-dependent oxidoreductase which has been extensively studied in humans and is functional only on Cys-type sulfatases. The other is a putative member of the *S*-adenosyl-L-methionine radical enzymes, we called anaerobic Sulfatase Maturing Enzyme (**anSME**) [1].

Using peptides as substrates, we successfully developed an *in vitro* maturation assay for this class of enzymes which allowed us to demonstrate that anSME are able to catalyze the anaerobic oxidation of cysteine into FGly [2]. We report here the first detailed characterization of anSME. Spectroscopic investigations established that anaerobically reconstituted enzyme possesses a [4Fe-4S] cluster that is able to bind *S*-adenosyl-L-methionine (SAM). *In vitro* experiments with various peptides substrates showed that anSME activity is tightly dependent of the peptides sequence. Surprisingly, we also demonstrated that anSME can oxidize not only cysteine but also serine residues and is thus the first dual substrate radical SAM enzymes.



Sulfatase maturation catalyzed by anSME

(1) Berteau O, Guillot A, **Benjdia A**, Rabot S. – 2006 – A new type of bacterial sulfatase reveals a novel maturation pathway in prokaryotes. *J Biol Chem.* 281(32):22464-70.

(2) **Benjdia A**, Leprince J, Guillot A, Vaudry H, Rabot S, Berteau O. – 2007 – Anaerobic sulfatase-maturing enzymes: radical SAM enzymes able to catalyze *in vitro* sulfatase post-translational modification. *J Am Chem Soc.* 129(12):3462-3.