

A biomimetic metalloporphyrin catalyzes indole oxidation with high selectivity

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Indole is one of the most common heterocyclic scaffolds available in nature. It occurs in several natural compounds, including alkaloids, plant hormones, flower scents and dyes.¹ Despite the structural simplicity of this molecule, indole oxidation commonly results in the formation of a large number of products, including the 2- or 3-oxygenated compounds, di-oxygenated and more complex molecules. For this reason, indole oxidation has become a widespread model reaction to test the efficacy of both biological catalysts^{2,3} and their synthetic analogues.^{4,5} Most of the catalysts examined so far gave poor selectivity toward any of the oxidation products.²⁻⁵

Here we present the results concerning oxidation of indole and its derivatives catalyzed by Mn-Mimochrome VI*a (Mn-MC6*a). Mn-MC6*a (Figure 1, A) is a synthetic peptide-porphyrin conjugate conceived to act as a miniaturized heme-protein model.⁶

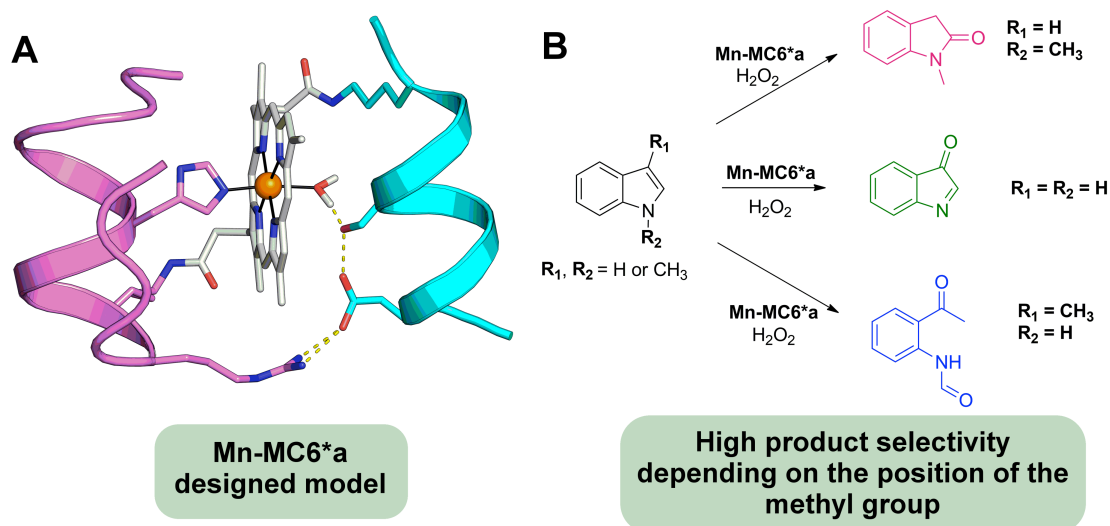


Figure 1: A) Designed model of Mn-MC6*a; B) oxidation of methyl-substituted indoles catalyzed by Mn-MC6*a.

Mn-MC6*a is able to oxidize indole under unprecedented site-selective conditions, yielding to 3-oxindolenine as single product. Additionally, the reaction selectivity is dramatically altered when 1- or 3-methyl-substituted indoles are used as substrates (Figure 1, B). The formation and isolation of the reactive 3-oxindolenine is highly important, since it is believed to represent a useful synthon in organic synthesis. Accordingly, the exploitation of its reactivity with nucleophiles, in order to provide one pot transformations, is currently ongoing, with the aim to further increase the synthetic potential of our catalyst.

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