

Kinetics and mechanism of the reaction of a nitroxide radical (tempol) with a phenolic antioxidant

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In the absence of redox-active transition metal ions, the removal of Tempol by Trolox occurs by a simple bimolecular reaction that, most probably, involves a hydrogen transfer from phenol to nitroxide. The specific rate constant of the process is small ($0.1 \text{ M}^{-1} \text{ s}^{-1}$). Metals can catalyze the process, as evidenced by the decrease in rate observed in the presence of diethylenetriaminepentaacetic acid (DTPA). Furthermore, addition of Fe(II) ($20 \text{ } \mu\text{M}$ ferrous sulfate and $40 \text{ } \mu\text{M}$ EDTA) produces a noticeable increase in the rate of Tempol consumption.