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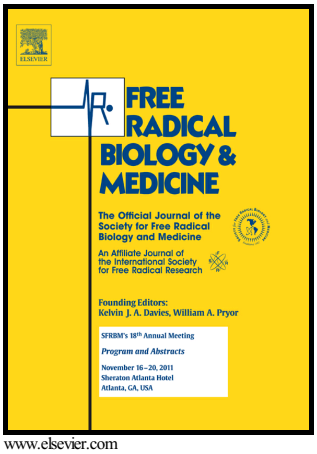

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ABSTRACT

The control of bleaching reaction is important in hair bleaching and laundry detergents to ensure quality of the final product. A better understanding of the reaction mechanisms is needed to minimize product failures. ^{31}P NMR-spectroscopy-based spin trap technique was employed to detect and quantify the free radical species that were generated in different bleaching solutions. These solutions contained the key actives in an alkaline hair colorant/bleaching product, an ammonium salt and hydrogen peroxide at pH=10. Generally, the main radical species detected in hair oxidative coloring or bleaching processes, were hydroperoxyl/superoxide radicals $HO_2^{\cdot}$ / $O_2^{\cdot-}$, amino radicals $^{\cdot}NH_2$ and hydroxyl radicals $^{\cdot}OH$. Their amounts showed a variation based on the chemical composition of the bleaching systems and the metal ion content. The generation of free radicals from reactions between transition metal ions, such as copper, and hydrogen peroxide at pH=10 was evaluated. In the absence of chelating agents, the copper ions generated a significant level of hydroxyl radicals in a Fenton-like reaction with hydrogen peroxide at pH=10. Besides that, an increase in copper ion content led to an increase of amino radical $^{\cdot}NH_2$, whereas the concentration of superoxide radical $O_2^{\cdot-}$ decreased which was not yet well reported in the previous literature.