

ATR-FT/IR Analysis of Bleaching Treatments on Wool Keratin Fibers

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abstract; The effects of three commercial bleaching agents (hydrogen peroxide, sodium percarbonate, and sodium hypochlorite) on wool keratin fibers were investigated using attenuated total reflection Fourier transform infrared (ATR-FT/IR) spectroscopy. It was found that the wool fabrics treated with chlorine bleaching agent (sodium hypochlorite) was damaged, and that with powder type of oxygen agent (sodium percarbonate) was slightly damaged, while that with liquid type of oxygen agent (hydrogen peroxide) was almost undamaged. After treatment with chlorine agent, IR amide I band (1650 cm^{-1}) of the wool fabrics was significantly broadened compared with those treated with oxygen agents or untreated wools, and a signal assignable to $\text{-SO}_2\text{-}$ group newly appeared at ca. 1120 cm^{-1} . This strongly suggest that disulfide (-SS-) groups in wool keratin was partly converted to $\text{-SO}_3\text{H}$ of cysteic acid via $\text{-SO}_2\text{-S-}$ by chlorine / oxygen bleaching, and it was accelerated by an elevation of temperature rather than an elongation of treatment time. It can be concluded that the treatment of chlorine bleaching agent on wool keratin fibers causes generation of chloramine, and it can be detected as the broadening of amide I band by using surface-sensitive ATR-FT/IR.

