Comparative Assessment of Chemical Disinfectants for Microbial Decontamination of Forensic Evidence

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Abstract

Contamination of forensic evidence is a great challenge that can compromise the credibility of forensic examinations. Microbial and particulate contaminants may be introduced during environmental exposure, improper handling, and laboratory procedures to interfere with analytical results. This study compares the efficiency of three chemical disinfectants widely used: ethanol, hydrogen peroxide, and sodium hypochlorite in reducing microbial contamination on various forensic substrates such as soil, saliva, and synthetic fibers. Controlled contamination experiments were conducted to simulate environmental and human exposure conditions. Decontamination efficiency was assessed through microbial culturing, microscopic particle counting, and statistical analysis. Results demonstrated that sodium hypochlorite showed the highest reduction in microbial contamination, followed by hydrogen peroxide, while ethanol showed comparatively moderate effectiveness. Statistical analysis using one-way ANOVA indicated significant differences among treatment groups. The findings emphasize the importance of choosing appropriate decontamination strategies in forensic laboratories for maintaining evidence integrity and improving the reliability of forensic analysis.

Keywords

Forensic evidence, contamination, decontamination, sodium hypochlorite, microbial analysis.