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In-situ monitoring of contact lenses disinfection/neutralization process using a SI-LOV format with in-line dilution

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Hydrogen peroxide is a powerful antimicrobial agent and an effective sporicide [1], thus is frequently used as a disinfectant in various pharmaceutical products like disinfection solutions for contact lenses. On the other hand, hydrogen peroxide is very toxic to the ocular epithelium and to the cornea therefore it must be neutralized before lenses wear [2]. For that reason the monitorization of the neutralization of hydrogen peroxide in the cleaning process is an important measure for user's safety.

For the in-situ monitoring of contact lenses disinfection/neutralization process an enzymatic assay for the determination of hydrogen peroxide was developed using a SI-LOV format system. The flow method was developed based on the reaction between hydrogen peroxide and ABTS in the presence of horseradish peroxidase. The produced oxidized ABTS was measured at 410 nm.

Two different disinfection processes were studied, one based on catalytic (platinum-coated disc) and another based on enzymatic (catalase tablet) neutralization. The study of these systems demonstrated that the neutralization of the hydrogen peroxide is concluded within 6 hours as recommended by the manufactures. Due to the elevated concentration of hydrogen peroxide present in the cleaning solution a high dilution factor was required. Therefore an in-line dilution step was performed by means of dialysis with a hydrophilic membrane in a linear mass transfer unit. The sample consumption was 15 µL/assay and the consumption of enzyme and ABTS was 9.0 and 51.9 µg/assay, respectively, with a linear range up to 342 mg/L of hydrogen peroxide.

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