

Topic: Cleaner leather production and closed-loop processing

Title: PERMEATION BEHAVIORS OF PROTEASE INTO ANIMAL HIDE AND THEIR KINETIC ANALYSES

Abstract: It is necessary to investigate the protease behaviors in the animal hide, and study their permeation kinetics, thus guiding the selection of the enzyme and the regulation of the enzymatic process of leather making. Fluorescently labeled proteases intended for permeation experiments were prepared, and their characteristics were determined, followed by a permeation tracking investigation. The confocal laser scanning microscopy was used to track the fluorescein isothiocyanate (FITC) labeled protease permeated in the hide, and the confocal images demonstrated that the main permeation route was the transfollicular route, and labeled proteases were localized within the hair follicles. The fluorescence intensity of the deeper layer increased and exhibited a state of diffuse, suggesting that there were also intercellular routes during the protease permeation in the hide. The FITC signals also could be detected on the flesh layer of the hide with relatively lower fluorescence intensity, indicating that the protease permeated from both sides of the animal hide, especially the side with hair follicles. Furthermore, the kinetics of each hide layer including hair covering, epidermis to grain layer, and grain to hair bulb layer was firstly analyzed, respectively, and the permeations could be described by Fick's second law. Combined with fluorescently labeling tracking studies, enzymatic dehairing results, and permeation kinetic studies, it could be concluded that the dehairing effects of proteases were not consistent with their corresponding proteolytic activities, but more consistent with the permeation behaviors of labeled proteases in the hide.

Keyword 1: Protease; Permeation; Hair follicle; Kinetics