EFFECT OF FATLIQUORING AND FINISHING ON MOISTURE ABSORPTION-DESORPTION OF LEATHER

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INTRODUCTION

The property of absorbing moisture is a valuable feature of articles in contact with human body, which avoid problems caused by accumulation of sweat on skin and in shoes [1]. The sorption of water causes the leather to act as a heat reservoir, protecting the body from sudden changes in external conditions. The moisture buffering ability of leather is determinant in comfort feeling and, when used in upholstery, enhances the indoor air quality of a room [2]. Caurie [3] describe three types of water moisture sorbed: a) water adsorbed onto the most energetic sites known as strongly bonded primary sites, b) water consisting of weakly bonded secondary molecules, and c) unbounded free liquid water that condenses at saturation pressure. The general shape of sorption isotherm can be described by a Type II isotherm with a small amount of water that persists at a very low relative humidity and a large amount of water at a high relative humidity [4].
Fatliquoring and retanning, are the most influencing treatments influencing leather handle and comfort [5, 6]. Fatliquors enhances fiber mobility, prevents fiber adhesion, improves handle and modify the internal sorbing surface of moisture, affecting their comfort feeling.

OBJECTIVE

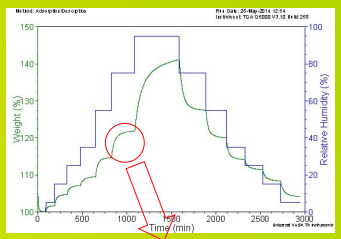
Determination of the ***half adsorption/desorption rate***, the ***apparent coefficient of diffusion*** and their relationships with fatliquoring, finishing, test mode in adsorption or desorption, and relative humidity

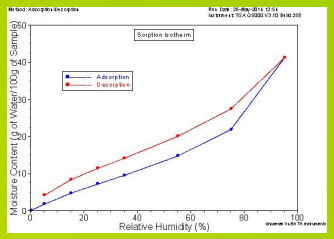
EXPERIMENTAL PART

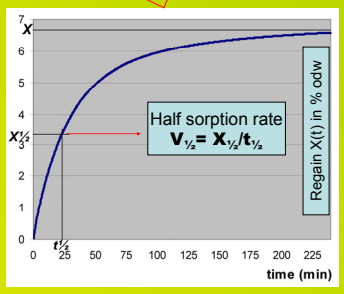
MATERIALS: Wet-blue sides from Ireland, shaved to a thickness of 1.2-1.4 mm, were used. Processed at the pilot plant of Trumpler (washing, rechroming, neutralization, dyeing). Fatliquoring was carried out by applying a 7 % of active matter on shaved weight. After washing and drying, moisture absorption/desorption tests were carried out. A light standard finishing was applied. Results before and after finishing were compared with those of the non fatliquored sample before and after finishing.
The main characteristic component of the fatliquors were the following:

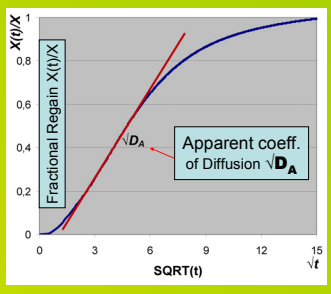
- ***TCSi*** Sulphited triglycerides of rapeseed oil,
- ***PGR*** Fatty Polymers (non water repellent),
- ***ESF*** Phosphoric Ester,
- ***PSi*** Sulphited fish oil, and
- ***TCSi/PGR*** a combination of the two first fatliquors used as standard reference fatliquor.

METHOD APPLIED TO DETERMINE MOISTURE DIFFUSION IN LEATHER

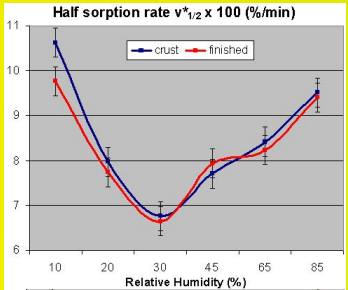


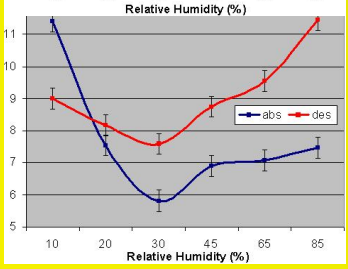


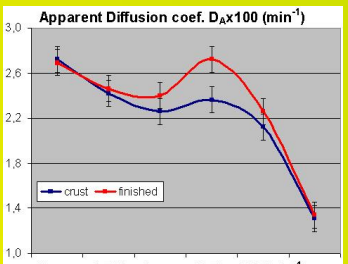


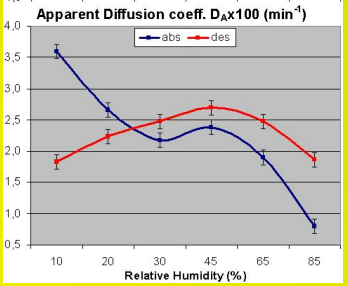


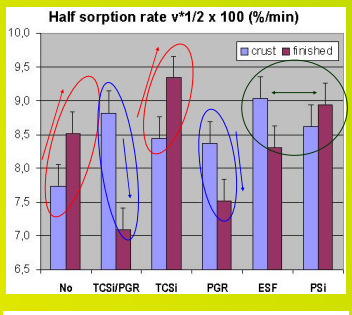
RESULTS

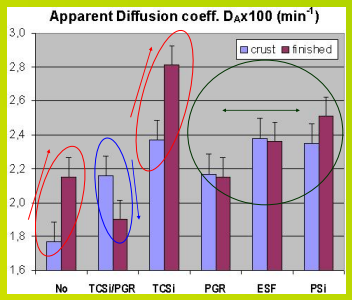








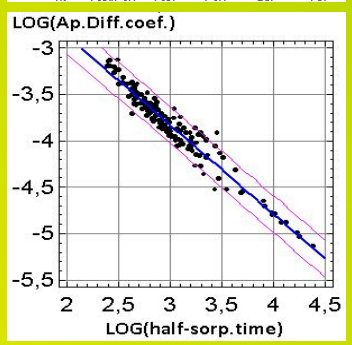




CONCLUSIONS

- Diffusion parameters are significantly influenced by fatliquor, step (crust, finished), mode (absorption/desorption) and relative humidity.
- The initial half-sorption rate tends decreases up to 30% RH and then, tends to ascend. At lower relative humidities crust samples show higher initial rates than finished ones, and the diffusion coefficient of finished samples is higher than crust ones when RH is around 45%.
- When mode of sorption is considered, higher half-sorption rates and diffusion coefficients are observed at lower relative humidities, while the contrary occurs at higher relative humidities.
- Finishing makes the half sorption rate and the diffusion coefficient in both non fatliquored leather and that fatliquored with TCSi to ascend.
- Finishing makes the half sorption rate of leather finished with TCSi/PGR mixture and PGR to decrease. The same occurs with the diffusion of the former while that of the later remains the same.
- Half sorption rate and diffusion coefficient are not significantly modified by finishing in leather fatliquored with ESF and PSi.
- The highest diffusion coefficients are reached by leathers fatliquored with TCSi after finishing and the lowest are those corresponding to the non fatliquored leather in crust and that fatliquored with TCSi/PGR mixture.

- The linear relationship between the logarithmic form of the time of half adsorption and the apparent diffusion coefficient suggests that the rate of adsorption is governed by the diffusion of moisture inside the sample.



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