



Chrome tanning process without a float and with low salt content^[Legend]

J.M.Morera⁽¹⁾, A.Bacardit⁽¹⁾, L.Olle⁽¹⁾, J.Costa⁽²⁾, H-P Germann⁽³⁾

⁽¹⁾Igualada Technical Engineering School (EUETII) Technical University of Catalonia, Spain (UPC)

⁽²⁾Chemical and Metallurgical Engineering Department Chemical Faculty, University of Barcelona, Spain (UB)

⁽³⁾Lederinstitut Gerberschule Reutlingen, Germany

The conventional chrome tanning process results in the significant pollution of wastewaters by residual chromium tanning compounds and common salt (sodium chloride). To reduce these effects, an investigation has been undertaken that involved a pickle without any float. Based on experience gained from earlier investigations, this approach uses a sulfoaromatic acid to replace inorganic acids, and seeks to find the minimum level of salt required.

These investigations involved small-scale trials where, in particular, the effects of various offers of both salt and the sulfoaromatic acid on the properties of the final leathers were studied and compared with a conventional tanning process.

Essentially the deliming used dicarboxilic acids to reduce the pH to 8.5 and provided complete deliming. This was followed by a pickle/tanning without float, where the acidity was provided by an acid offer (sulfoaromatic acid) of between 0% and 3%, and the chrome offer. In addition to the different offers of acid, the salt offer varied between 0% and 3%. Magnesium oxide was used for basification.

The leathers produced were then processed to the final state. These were then assessed by five experts and the aesthetic properties of the leathers were determined against the variables. The leathers were then analysed for Cr₂O₃, shrinkage temperature, tensile strength, elongation, tear load, and lastometer results in terms of distension and load to crack and burst.

A statistical analysis was then carried out to establish the influence of these variables on the acceptability of the leathers.

As expected, the investigations reduced wastage in terms of chromium, salt and water. In addition, the uptake of chromium was high and there were concerns that this increase was sufficient to have a negative effect on the physical properties of the leathers. However, the influence of the variables on these leathers were identified and are given below:

THE INFLUENCE OF SULFOAROMATIC ACID ON LEATHER PROPERTIES

- The higher the addition, the higher the shrinkage temperature of the leather.
- The higher the addition, the lower the tensile strength, although this trend stabilised at higher offers.
- The higher the addition, the lower the tearing load.
- No relationships were found with the % elongation of the leather at burst.

- No relationships were found with the chrome content of the leather.

THE INFLUENCE OF SALT ON LEATHER PROPERTIES

- The higher the addition, the lower the tensile strength.
- The higher the addition, the lower the tearing load.
- The higher the addition, the lower the distension at grain crack.
- The higher the addition, the lower the load at grain crack.
- The higher the addition, the lower the distension at burst.
- No relationships were found with the distension at burst.
- No relationships were found with the chrome content of the leather.

THE HANDLING AND COMFORT PROPERTIES OF THE LEATHER

It was agreed, by the experts assessing the organoleptic properties, that the leathers were acceptable, although the grain was a little rough. It is not clear whether this was a function of the higher chrome uptake on the grain or if all of the leathers assessed showed this tendency as a result of it being small-scale trials.

Findings from the investigation

Based on the findings from previous investigations, a salt-free tanning system without a float has been developed. The absence of float prevents acid swelling, and the function of both salt and the sulfoaromatic acid in terms of leather properties is determined.

This technique is seen as a means to provide a reduction in water and chromium consumption, and salinity as a component in treated effluents discharged from tanneries. 

Legend and Acknowledgements

This article is a summary of the paper entitled:

"Study of chrome tanning process without float and with low-salt content as compared to a traditional process. (Part II)". This paper was originally published in JALCA, December 2006, Vol 101, pages 454 to 460. The authorship is as set down in the headings of this paper.

The original paper provides the detailed procedures, analytical results, and the findings in full from this investigation.