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## LETTERS TO THE EDITOR

### Studies on water proofing of sole leather

Water proofing of sole leather has been a problem engaging the attention of the tanners and research workers for the past several decades.<sup>1,2</sup> The ISI has prescribed as maximum limit of 45 percent in 24 hours (Kubelka's method). However, many sole leather samples, especially from the Kanpur region, fail to stand up to this specification. More often than not, the water absorption figures are above 50 percent. The tanners have been seized of this problem, but much headway has not been made for a solution since high cost technology, involving costly chemical formulations and that too, requiring careful control and supervision during the water proofing operation, could not find favour with the Indian tanners. Actually the specification for 'export quality sole' is much more stringent and a figure of above 25 percent is not accepted by the foreign buyers. The tanners would prefer simple techniques with an accent on economy and hence many of the elaborate procedures invented during the last two or three decades have not been commercially exploited. Also the colour of the sole leather has all along been a sensitive issue with the tanners and many water proofing recipes like the 'chrome fatty acid complexes' were not to the liking of the fastidious tanners.

In the following experiments, it has been attempted to reduce the water absorption by adopting fairly simple methods, using ammonium oleate in water medium with or without a small quantity of oil or emulsifier. The experiments were done on a laboratory

scale on unrolled sole leather pieces of dimensions 20 cm x 20 cm. The details are given below:

Ammonium oleate was prepared by neutralising oleic acid with 1:1 ammonia to pH 7. The compound was dissolved in water. The concentration of ammonium oleate soap was 5 percent on the weight of leathers taken for water proofing and the float was adjusted to around 400 percent. The same procedure was adopted for all the experiments and samples of sole leather (weighed) were put in this emulsion and treated for water proofing for 24 hours. In one experiment, 2% T.R.O. (on the weight of the leather) was added to the ammonium oleate solution. In another experiment, the treated piece was further processed with basic aluminium sulphate (pH 4). After the experiments were over, the pieces were hung to dry. No rolling was done and the pieces, after the normal conditioning, were analysed for their water absorption using Kubelka's apparatus. The results are given below:

Sample	Water absorption%		
	1/2 hr.	2hrs	24hrs
1. Treated with ammonium oleate	33.0	36.1	41.2
2. Treated with ammonium oleate + 2% T.R.O.	27.5	30.4	40.6
3. Ammonium oleate followed by alum treatment	33.5	37.7	38.9
4. Control	41.0	46.5	49.8

From the results, it may be seen that all the experimental samples conform to the ISI specification. Ammonium oleate treatment followed by alum gives the best result. One good aspect which was particularly relevant was that the treated samples retained the good colour without the least darkening or discolouration. Hence, it can be safely concluded that ammonium oleate is a simple but effective water proofing agent. However, further experiments are still going on using different combinations of the above soap with emulsifiers/vegetable oils/alum before and after basification etc. Incorporation of a little tallow (2 percent) along with oil during oiling in the manufacturing process<sup>4</sup> has also been found to increase water resistance.

Another way of attacking the problem of water absorption is to improve the tannage itself whereby the leather is made more solid and compact<sup>5</sup>, whereby penetration of water is made minimal. This is also being done.

Microscopical studies are also being carried out to assess the compactness of the fibre bundles and also to ascertain the extent of penetration of the water proofing agent inside the leather. They will be reported in the next letter.

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