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# RECYCLING OF LEATHER WASTE CONTAINING CHROMIUM – A REVIEW

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## ABSTRACT

Chromium tanned leather is the preferred option for tanning leather used in footwear due to the high performance and unique properties it confers to the final product. However, huge amounts of chromium tanned leather wastes are generated and mostly discarded to landfills by the leather industries annually worldwide. This represents wasting of the contained resources and it is a cause of environmental concern, mainly due to the presence of chromium in those wastes. Thus, more sustainable alternatives than landfilling for chromium-tanned leather scrap were the objective of several works.

Direct use for reduction of Cr(VI) in the preparation of chromium tanning agent and in cleaning operations to remove oils, hydrocarbons, solvents, metals and other chemicals from grounds and aqueous media were found as feasible options. As leather wastes are intrinsic fibrous it opens a potential window for using them as raw materials to prepare leather foils and boards, and as additives for plastic or rubber composites. Wet treatments are also possible options for chromium tanned leather scrap. Hydrolysis of shavings with alkalis such as CaO, NaOH and MgO at moderate temperatures are able to recycle amino acids and peptides usable for animal feeding, fertilizers, packaging for agriculture, and for producing reagents to close the tanning loop, among others. Acid treatments of chromium-tanned shavings have also been studied and lead to the removal and dissolution of chromium (III) from the complex collagen–chromium. Biotechnological techniques requiring less energy and involving enzymes in one or more sequential extraction steps, may recover gelatine, collagen hydrolysate and chromium cake from chromium tanned leather shavings. Not surprisingly, heating value of leather is similar to wood which makes its use as a heating source a logical option. Several research groups and companies have been working to develop adequate technologies for this safe application, including recovery of chromium contained in the ashes.

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