

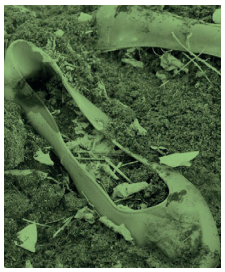
ASSESING LEATHER BIODEGRADABILITY BASED ON THE LATEST GENERATION OF TANNING AGENTS

M. Bonilla-Espadas, M. Bertazzo*, F. Arán-Ais, E. Orgilés-Calpena
INESCOP. Footwear Technological Center. 03600 Elda (Alicante), Spain
biotecnologia@inescop.es

EURO 2022 IULTCS

ABSTRACT

A growing consumer awareness on sustainable products as well as intensified government landfilling legislations, has driven the leather industry into developing more efficient production processes and greener tanning agents, consequently promoting final product circularity focused on compostability as a way to improve product end of life environmental impact. For such purpose, innovative and specific test methods are now required to evaluate biodegradability and compostability of leather within relatively short time span at affordable costs. Standardised methods are currently available for plastic material testing nevertheless due to significant differences in leather properties compared to plastics, these methods must be adapted to leather characteristics and performance. In this sense, a series of comparative assays have been undertaken to compare of tanned leather samples biodegradation profiles under controlled aerobic conditions in liquid medium (ISO 20136:2020) and under controlled composting conditions (ISO 14855/1) for leather compostability assessment standardisation purposes about.

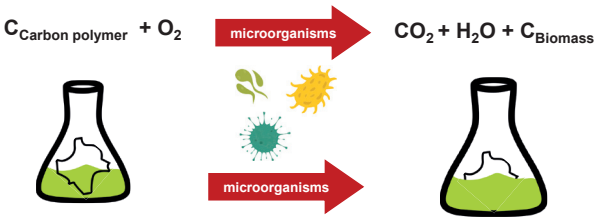


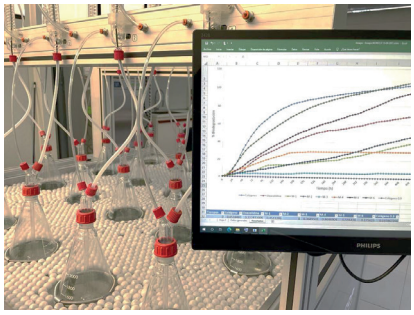
INTRODUCTION

One of the current challenges in the tanning industry is achieving metal-free, high quality and compostable leather suitable for agricultural compost as a mean of achieving circularity at product end-of-life. Therefore, tanning industry is deeply invested in reducing hazardous chemicals usage as well as improving leather biodegradability. In this matter, to assess leather biodegradability according to the specific standard ISO 20136, INESCOP has developed and patented a fully automated smart technology capable of estimating leather degradation potential in just 30 days. The goal is to provide companies with robust methodologies to evaluate the technical feasibility of their sustainable-by-design leather tanning formulations. More accurately, CO_2 produced is measured during the leather degradation under aerobic conditions by microorganism present in a liquid medium is converted into a leather biodegradation profile. Therefore, this study aims so assess leather biodegradation profiles in liquid medium (ISO 20136) as a function of the tanning agent used besides the biodegradability profile achieved under controlled composting conditions (ISO 14855/1).

MATERIALS & METHODS

Leather biodegradability – ISO 20136:2020





DEVELPOED EQUIPMENT FOR ISO 20136:2020

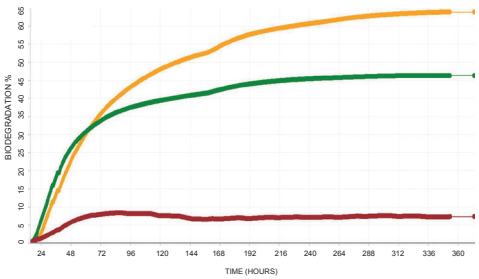


LEATHER SAMPLES TESTED UNDER REAL COMPOSTING CONDITIONS (COMPOST BIN) AT LOCAL ORGANIC WASTE MANAGEMENT PLANT

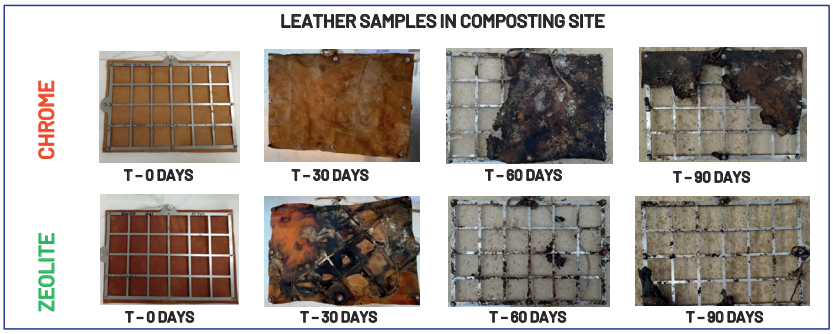
RESULTS & DISCUSSION

ISO 14855 (BIODEGRADATION IN COMPOST)

COLLAGEN
ZEOLITE
ALUMINUIM 1

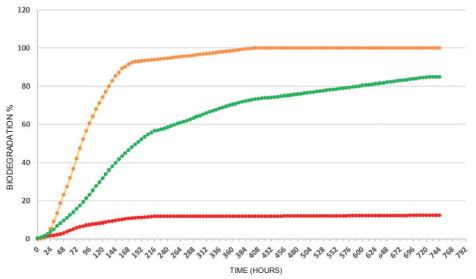


LEATHER SAMPLES IN COMPOSTING SITE



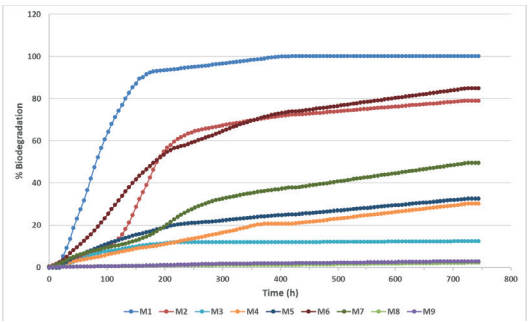
ISO 20136 (BIODEGRADATION IN LIQUID MEDIUM)

COLLAGEN
ZEOLITE
ALUMINUIM 1



DISTINCT ASSESED LEATHER SAMPLES

M1	COLLAGEN
M2	OXAZOLIDINE
M3	ALUMINUIM 1
M4	ALUMINUIM 2
M5	SULFONE * VEGETABLE
M6	ZEOLITE
M7	"DURABLE LEATHER"
M8	MODIFIED GLUTARALDEHYDE
M9	CHROME WET BLUE



CONCLUSIONS

- Biodegradation results achieved under liquid medium ISO 20136 and composting conditions ISO 14855 show very similar results for chrome and zeolite tanned samples*.
- Results obtained from tests under real composting conditions confirm biodegradability curves obtained with harmonized ISO standards*.
- Chrome tanned leather is still the less biodegradable leather in both ISO standards, whilst zeolite show the most favourable result.

*For poster optimization, only chrome and zeolite tanned leather results are shown for composting on site and ISO 14855. INESCOP disposes of results for all leather samples mentioned above.

ACKNOWLEDGEMENTS

GENERALITAT VALENCIANA
IVACE INSTITUTO VALENCIANO DE COMPETITIVIDAD EMPRESARIAL
UNIÓN EUROPEA Fondo Europeo de Desarrollo Regional. Una manera de hacer Europa

COLLABORATORS

INESCOP FOOTWEAR TECHNOLOGY CENTRE
CROMOGENIA UNITS
vaersa grupo GENERALITAT VALENCIANA
LAJARA CURTIDOS
Curtidos Segorbe Leather solutions

REFERENCES:

- https://www.iso.org/standard/57902.html
- https://www.iso.org/standard/75892.html
- https://www.inescop.es/es/inescop/actividad/proyectos-i-d-i/proyectos-i-d-i-ivace/ivace/51-2020-1/572-bioreq-ii