Tanning agents

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Invention

The present invention relates in general to the tanning field, and more specifically to **new tanning agents for animal hides and to a pre-tanning, tanning or retanning process that uses them**. This process allows to obtain a finished product with optimal aesthetic and functional characteristics, also meeting the requirements of health, ecology and environmental safety that are nowadays required also for industrial processes in the tanning sector.

The agents commonly used in these processing phases generally contain heavy metals. Chromium salts, for example, in view of their tanning capacity and relative cheapness and speed of processing, imply the use of large quantities of acids, in particular sulphuric acid, even in the form of pre-treatment of the leather to be tanned during the "pickling" phase. The **environmental impact** of this type of processing is therefore considerable, and the **additional costs** for the disposal of large quantities of wastewater have a strong impact on production costs.

On the other hand, the experimentation undertaken has demonstrated the **tanning capacity of compounds extracted from renewable materials, including waste materials**, when the main conditions adopted for the tanning process on bovine, ovine-goat and exotic hides prepared for the tanning phase vary. The tanning agents, object of the invention, can also be used as pickling agents and as pre-tanning agents, for example in vegetable and chrome tanning processes.

Such compounds may be used either as the sole tanning agent of the process or in combination with other tanning agents; either alone or in a mixture with each other; either in pure form (pure molecules of the aforementioned **furan derivatives**, Figure 1) or in a **crude aqueous solution obtained from a biomass of lignocellulosic nature** or in general from products containing mixtures of saccharides or polysaccharides.

PO.TE.CO. S.C.R.L. - SOCIETÀ GENERALE PER LA GESTIONE DEL POLO TECNOLOGICO CONCIARIO and LABORATORI ARCHA S.R.L. are also patent applicants.

Drawings
& pictures

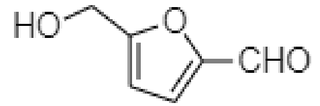

Figure 1. *Furanic derivative as tanning agent, generally contained in food, such as coffee, dried fruits (prunes), beer, cereals and bread. It is accepted as flavoring substance in food.*

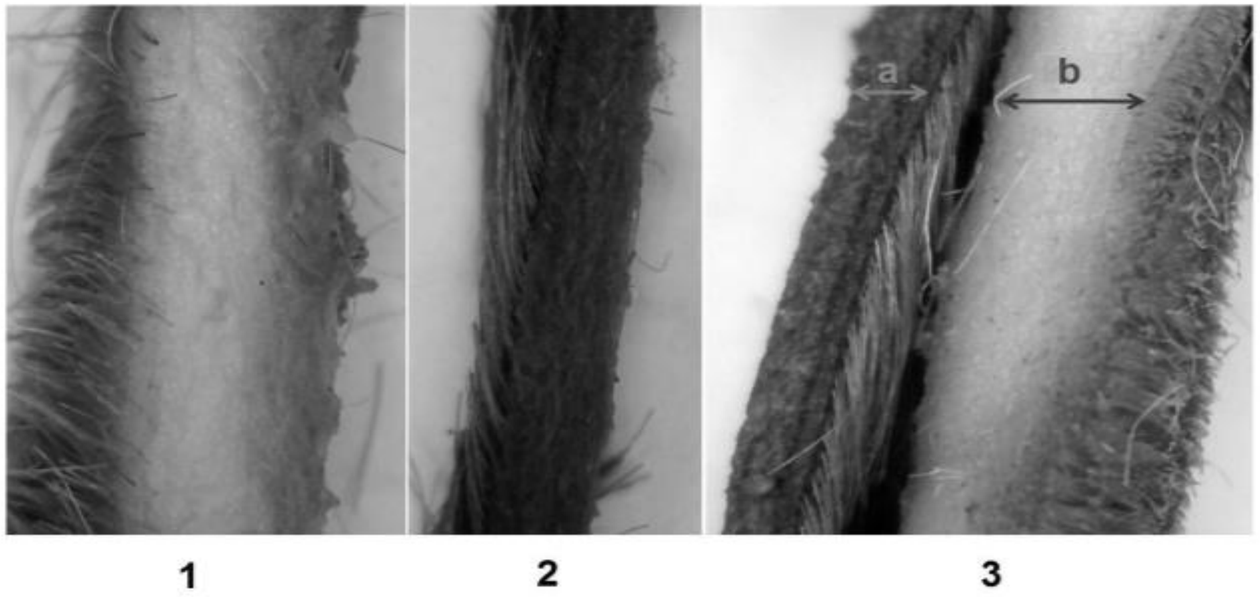

Figura 2. 1) Section of pickled skin at pH 4.5, not yet tanned, with Tg equal to 63°C; 2) section of skin tanned with aqueous solution of HMF and BHMF at pH 7.4 with Tg equal to 72°C; 3) section of tanned skin (a) and section of pickled skin (b) viewed side by side for comparison.

Industrial applications

The identification of **innovative production processes** with **reduced environmental impact**, integrated with an approach aimed at **circular economy**, is one of the challenges of the Made in Italy and not only.

University of Pisa and POTECO S.C.r.L. invented and developed a tanning process that involves the **use of chemical "metal free" agents, obtained from biomasses** already present in the area. The proposed tanning molecules are highly innovative in this field and their great strength is that they are totally non-toxic and biodegradable. The starting materials are in fact available in the Tuscan territory, they are low cost or even waste from the agricultural sector, and the conversion process is environmentally and economically sustainable.

The invention proposed introduce in the tanning industry:

- a class of **non-toxic and biodegradable tanning agents**;
- an **innovative tanning chemical processes**;
- the possibility to reuse renewable raw materials;
- new production and subsequent use of hypoallergenic and hypotoxic leathers;
- the absence of environmental contamination with heavy metals (e.g., Aluminum, Chromium, Iron, Titanium and Zirconium), since they are absent in the manufacturing process covered by the invention.

The toxic agents used in the tanning sector, or more generally in the entire textile sector, are not only harmful for the workers in the industries, forced to be in daily contact with these substances. Leathers or clothes can also be harmful for those who use or wear them, if they present more or less important traces of the chemicals used during processing.

Possible developments

The patent opens new scenarios in the panorama of **tanning agents available from renewable raw materials**, proposing a **new class of non-toxic and biodegradable agents**. In fact, innovative molecules easily obtainable directly from **biomasses** present in the territory have been tested with excellent results. The innovative tanning system thus makes possible to obtain a finished product with optimal aesthetic and functional characteristics, with respect to the ecosystem and ensuring maximum environmental and economic sustainability.

The collaboration with PO.TE.CO. s.c.r.L. allowed to transform a project idea into a concrete results that can have an important impact on the entire tanning sector.

Future collaborations with many industrial partners are expected in order to accelerate the progress towards **totally eco-sustainable processes and products useful for this sector**.

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