



Chrome recovery

Working principle

The waste waters produced during the tanning stage of skins are treated using a special process of electro dialysis.

The anionic membrane functionalised with trimethylammonium ($\sim\text{N}^+(\text{CH}_3)_3$) cationic groups with basic pHs is subject to a rapid phenomenon of fouling due to the attraction of the electrolytic surface to functionalised organic species present in the spent solution.

This difficulty is overcome by efficient hydrophobic protection, provided by pre-treating the surface of the membrane with a special polymer functionalised with anionic groups able to satisfy the cationic species present on the surface of the membrane in a stable manner. This way a “macromolecular” structure is created disposed in an extensive arrangement so as to maximise the number of saline bonds made: thus organised the protective macromolecules turn their hydrophobic side towards the watery solution and so prevent the deposition of the organic substances.

The cathodic area is therefore characterised by an increase in the pH with separation of the chrome hydrate in an excellent state of purity given that precipitation takes place in an environment free of anionic bonds of an organic type accumulating during the tanning process; the continual withdrawal of this suspension and the separation of the chrome hydrate for deposition enable purification of the spent solution.

Optimisation of the process, performed by the correct sizing of the membrane cells, adjustment of the intensity of current and potential applied, the flow and number of cycles, makes it possible to achieve, in an efficient manner, after dissolution of the precipitate in sulphuric acid, an extremely pure chrome sulphate which can be re-used for tanning.

Performance

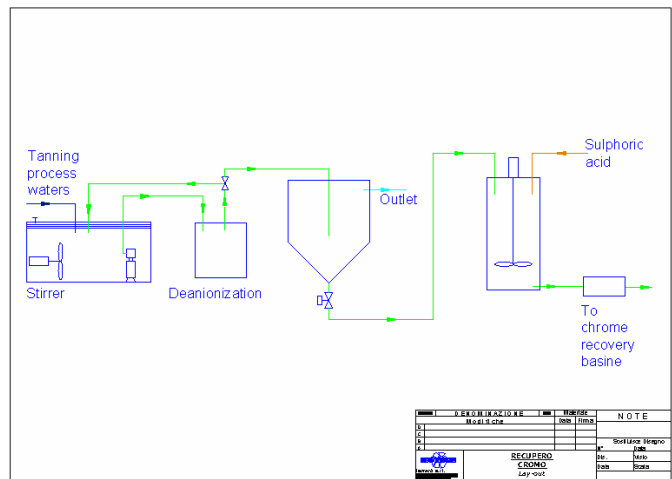
- The system used makes it possible to recover 98-99% of the chrome contained in the spent tanning bath.
- The remaining waters, still containing the chrome bound to the organic substance (max 5-6%) may be sent for final processing and be re-utilised in the pickel phase prior to tanning.
- The chrome, at a level above 90%, is recovered in the form of hydrate with a very low content of organic substances.
- Compared to the classic method of chrome precipitation with soda and other alkaline agents, where the chrome hydrate precipitated is about 1/3 of its initial volume, this system makes it possible to obtain a quantity of precipitate equal to approximately 1/12 the initial amount.
- The precipitate has a content of dry substance equal to 15-20% so that it does not require further and costly concentration processes.



- The acidification of the precipitate obtained by electrochemical means makes it possible to obtain solutions of Cr (III) which are much more concentrated than with the traditional method using soda or other basifying agents.
- The dissolution in sulphuric acid is much faster.



ChR vista di insieme





Technical – functional data

ChR5

ChR10

Water treatment capacity

5 m³/h10 m³/h

Remover Cr (III) min

98 %

98 %

recovery Cr (III)

93 – 95 %

93 – 95 %

Membrane stacks

N 100+100+100

N 150+150+150

Power used

6 kW

10 kW

Dimensions

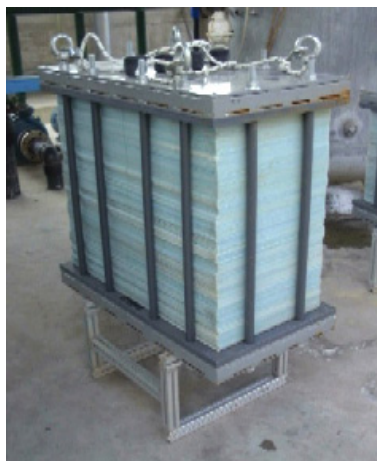
2000 x 2000 x 2500 mm

2000 x 2000 x 2500 mm

Engaged Area

4000 x 4000 mm

4000 x 4000 mm



ChR membrane stacks



ChR sedimentation chrome