



Chamois leather process based on rubber seed oil, and rationalisation of the oxidation stage

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Chamois leather has unique uses, including high quality gasoline filtration, gloves, garments, and cleaning and drying of optical equipment, spectacles, windows, vehicle, jewellery, and silverware.

Indonesia is a rubber producing country with the largest rubber plantations in the world. Here, it produces rubber seeds from about 1,500 kg/hectare of land, and this resource has not been utilised optimally. It was considered that rubber seed oil could be used for chamois leather tanning, and an investigation took place to see if:

[1] rubber seed oil could be used as chamois leather tanning agent

[2] the time consuming oxidation stage could be rationalised.

Investigation 1: Tanning with rubber seed oil

The tanning process consisted of the substitution of fish oils with rubber seed oil in conventional chamois leather procedures using goat skins. The procedures used included pretanning, oil tanning, milling, oxidation, washing, staking, drying, toggling, and buffing. The physical properties (tensile strength, elongation at break, water absorption) and chemical properties (pH and ash content) were measured, and organoleptic characteristics such as softness, colour and odour, were assessed. These findings are given as *Panels 1, 2 and 3*.

This shows that the chemical, physical properties, and the organoleptic characteristics of rubber seed oil tanned chamois leather were similar with those tanned with fish oils. Moreover, there were improvements in terms of colour and odour.

Investigation 2: Rationalisation of the oxidation process

A weakness of the traditional chamois leather tanning process is that the oxidation process takes a relatively long time - nine to 14 days. Having created a chamois leather using rubber seed oil, based on the traditional approach to fish oil tanning, it was considered that the process required rationalisation to shorten this time.

Accordingly, an investigation was carried out on a small scale, where, in the rubber seed oil oxidation stage, the process was modified by making additions of three different oxidising agents. These were sodium percarbonate, hydrogen peroxide, and sodium hypochlorite, and these were applied in a drum for six hours. Three concentrations of each of these oxidising agents were used, and it was found that the oxidation stage could be accelerated. Of the three agents used an application of 2% sodium hypochlorite resulted in leathers with the best water absorption properties and organoleptic characteristics. The leathers met the quality requirements for chamois leather (SNI 06-1752-1990), and the properties are set down in *Panels 4, 5, 6, 7 and 8*.

Findings from the investigations

From these two sets of investigations it was found that:

- Rubber seed oil could be used as a tanning agent and had potential as a substitution of fish oil in tanning to produce

Panel 1: Physical properties of rubber seed and fish oil tanned leathers

Physical properties	Rubber seed oil tanned leather	Fish oil tanned leather
Thickness (mm)	0.4 - 1.0	0.4 - 1.0
Tensile strength (N/mm ²)	9.5	7.7
Elongation at break (%)	104	91
Water absorption (%):		
-2 hours	388	395
-24 hours	424	437

Panel 2: Chemical properties of rubber seed and fish oil tanned leathers

Chemical properties	Rubber seed tanned leather	Fish oil tanned leather
pH	6.9 - 7.0	7.1 - 7.3
Ash content (%)	4.8	3.0
Oil content (%)	6.0	6.0

Panel 3: Organoleptic characteristics of rubber seed oil and fish oil tanned leathers

Organoleptic properties	Rubber seed oil tanned leather	Fish oil tanned leather
Softness	7 - 8	7 - 8
Colour	8 - 9	6 - 7
Odour	7 - 8	5 - 6

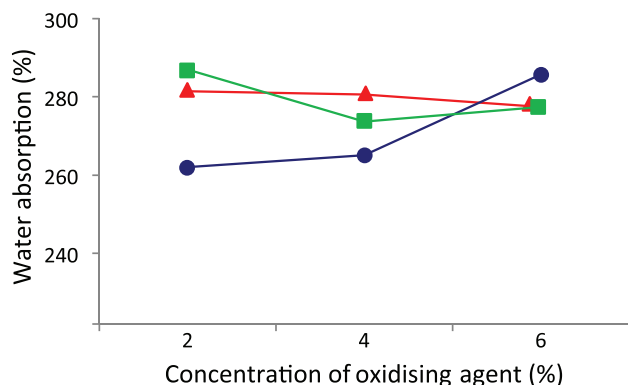
* In 10 point scale, 0 = poor, 10 = excellent.

chamois leather. The colour of this leather was considered to be better than that found with traditional fish oil tannage, and the odour improved.

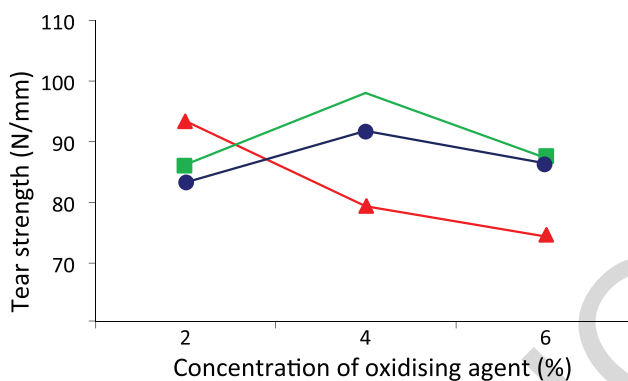
- The oxidation process of chamois leather tanning could be shortened by up to about three days by the application of an oxidising agent. It was considered that a 2% offer of sodium hypochlorite produced the best results. ☺



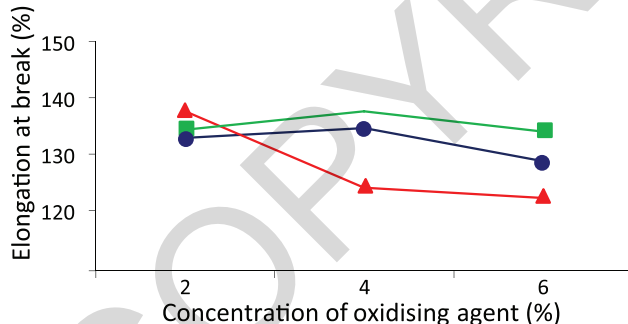
Panel 4: Water absorption: Oxidising agents: sodium percarbonate, hydrogen peroxide, sodium hypochlorite



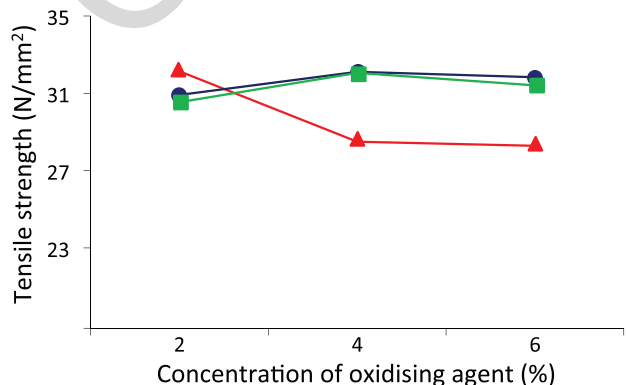
Panel 5: Elongation at break: Oxidising agent: sodium percarbonate, hydrogen peroxide, sodium hypochlorite



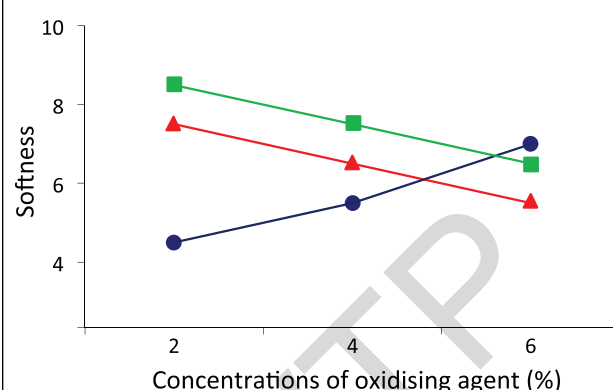
Panel 6: Water absorption: Oxidising agents: sodium percarbonate, hydrogen peroxide, sodium hypochlorite



Panel 7: Tensile strength: Oxidising agent: sodium percarbonate, hydrogen peroxide, sodium hypochlorite



Panel 8: Softness: Oxidising agent: sodium percarbonate, hydrogen peroxide, sodium hypochlorite



Key:
▲ Sodium percarbonate
● Hydrogen peroxide
■ Sodium hypochlorite

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