Study on pickle-free tanning and environmentally-friendly beamhouse process by enzymatic unhairing and biopolymers

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Introduction

Considering environmentally friendly leather processing technology, the reduction of effluent treatment costs and pollution load will be primary issues for tanneries. The pickling process requires a large amount of neutral salt and strong acid, which increases the load and the cost of wastewater treatment. Eliminating this process would reduce these figures. The compound of specific organic acids enables pickle-free tanning. It was introduced to institute of technology and some selected tanneries to solve this issues.

Methods

The trial was conducted by HIRANO INDUSTRIES CO.,LTD., a Japanese tannery. 30 domestic bovine raw hides were offered for this trial. To achieve environmentally-friendly liming process, the high concentrated keratinase enzyme and unhairing auxiliary based on reductive organic compounds were used in this study. A biopolymer-based agent which removes wrinkles and achieves a high area yield was used in deliming process. Aiming to increase the value of the finished leather. The hair removal competently achieved without using Na_2S and NaHS flakes.

Chromium Tanning

Process	%	Product	min	Remark
Tanning	50	Water		20˚C
	2	Sodium chloride		
	2	**Specific organic acids**	90	pH:4.5 Be:5
	0.5	Fatliquoring agent	60	
	4.5	Chrome tanning agent(33)	60	
	0.15	Antifungal agent	420	
Overnight	Intermittent operation			
Next morning				pH:3.8 Be:4.5
Washing				
Drainage				

Result

	Chromium content(%) (wet blue)	Chromium content(%) (drainage)	Ts (˚C)
ConventionalMethod Used Chrome tanning agent(**7%**)	**4.6**	**5.6g/L**	**111 (MAX) 110(avg.)**
New method(**4.5%**)	**4.6**	1.7g/L	109 **(MAX) 107(avg.)**

Conclusion

The uptake of chromium was greater improved comparing to conventional methods. This imparts following synergistic benefits- the reduction of dosage(%) chromium tanning agent and the chromium content(g/L)in effluent. In addition, A biopolymer gave wrinkle-less smooth grain and larger in area yield, which imparts the higher values in crust and finished leathers. Possibility to reduce total chemical costs up to 30% in this study. It would be ideal production recipes to both maximize environmental efficiency and archive the quality of several tanning at the same time. Some Japanese tannery has successfully adapted this pickle-free system and run the production following this study.