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### Cleaner Dehairing Technology for Goatskins: Effects of Hydrosulfide and Peroxide on Enzyme Unhairing

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**Authors** [Wei Xu](#), [Li Fen Hao](#), [Lei Zhou](#)

**Keywords** [Enzymatic Unhairing](#), [Goat Skin](#), [Hair-Saving](#), [Hydrosulfide](#), [Peroxide](#)

**Abstract** Traditional lime and sulfide dehairing process is a major source of the pollution, such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), total dissolved solids (TDS), total suspended solids (TSS) and toxic H<sub>2</sub>S gas, etc. Enzymatic dehairing process is known to be cleaner but its dehairing effects are unsatisfactory. Hence, an attempt has been made to solve those two unhairing methods' disadvantages through a biochemical approach. Several commercial enzyme formulations were chosen to research effects of hydrosulfide and peroxide on its activities, and then hair-saving enzymatic unhairing experiments with those two reagents were conducted in paste and pile method more effectively and cleanly. Results show that activity of enzyme 2709 is stabilized by the addition of hydrosulfide through activity measurements; Peroxide has some activation effect on protease 3942. Hair removal is found to be complete using scanning electron microscope (SEM) analysis. Those two processes enjoy a significant reduction in BOD, COD, TDS and TSS. The performances of the experimental leathers are also comparable to that of conventional ones. Therefore, those are cleaner processing technologies that could be chosen to solve traditional methods' disadvantage.

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### First page example



## Cleaner dehairing technology for goatskins: effects of hydrosulfide and peroxide on enzyme unhairing

Wei XU<sup>1, a</sup>, Lifen HAO<sup>1</sup>, Lei ZHOU<sup>2</sup>

<sup>1</sup> Key Laboratory of Auxiliary Chemistry and Technology for Chemical Industry, Ministry of Education, Shaanxi University of Science and Technology, Xian, 710021, P. R. China

<sup>2</sup> Technical Center for Safety of Industrial Products of Tianjin Entry-Exit Inspection and Quarantine Bureau of P. R. China, Tianjin, 300201, P. R. China

<sup>a</sup>xwforward@163.com

**Keywords:** Enzymatic unhairing; Hair-saving; Goat skin; Hydrosulfide; Peroxide

**Abstract:** Traditional lime and sulfide dehairing process is a major source of the pollution, such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), total dissolved solids (TDS), total suspended solids (TSS) and toxic H<sub>2</sub>S gas, etc. Enzymatic dehairing process is known to be cleaner but its dehairing effects are unsatisfactory. Hence, an attempt has been made to solve those two unhairing methods' disadvantages through a biochemical approach. Several commercial enzyme formulations were chosen to research effects of hydrosulfide and peroxide on its activities, and then hair-saving enzymatic unhairing experiments with those two reagents were conducted in paste and pile method more effectively and cleanly. Results show that activity of enzyme 2709 is stabilized by the addition of hydrosulfide through activity measurements; Peroxide has some activation effect on protease 3942. Hair removal is found to be complete using scanning electron microscope (SEM) analysis. Those two processes enjoy a significant reduction in BOD, COD, TDS and TSS. The performances of the experimental leathers are also comparable to that of conventional ones. Therefore, those are cleaner processing technologies that could be chosen to solve traditional method's disadvantage.

### Introduction

With more and more peoples awareness of the importance of environment, severere strictions from the global leather buyers and countries as well as native pollution monitoring agencies have forced the leather sector to look for various cleaner tanning methodologies. Among series of operations, dehairing procedures are known for uncleanness and contribute to 60-70% of the total pollution load in leather processing. The conventional dehairing process with sodium sulfide and lime contributes a significant amount of BOD, COD, sulfide, and solid wastes. Extensive use of sodium sulfide bears unfavorable consequences on environment and the efficacy of effluent treatment plants. Consequently, it seems worthwhile to look for alternative dehairing processes, which could completely replace the lime and sodium sulfide and diminish the eco-toxicological parameters. Enzyme is a kind of bio-catalyst and no toxic itself, which can react with components of skin such as collagen protein, keratin, glycoprotein and fat, etc. Thus plenty of components useless to leather manufacturing will be removed so that collagen fiber can be moderately opened. Several researchers have tried and rationalized enzymatic dehairing as an alternative to sulfide dehairing [1-3]. Even then, tanners are still hesitant to use the enzyme because the quality and activity of proteases used in traditional process are so unstable that it can lead to loosening, putrifying and fine hairs, etc. disadvantages. Therefore application of enzymatic unhairing is limited to some extent. Taking into account the superior effect of liming dehairing and the cleaner trait of enzymatic unhairing, enzymatic dehairing process assisted by sulfide or other auxiliaries has attracted much interest [4-7]. During the enzyme-assisted unhairing process synergistic effects, which can not only improve the sole enzyme dehairing's effects but greatly reduce the pollution loads compared to conventional liming dehairing, can be formed. However, there is little information about effects of auxiliaries on enzyme activities and dehairing's effect.

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