Dedication

Dedicated to my parents, my brothers and sisters and to my husband and children.

Acknowledgement

At first, the researcher recalls the gratefulness to almighty Allah.Then I expresses my sincere gratitude and deep indebtedness to my supervisor P.Gurashi Abdalla Gasmelseed, Professor of Chemical Engineering under his experience,guidance and constant inspiration, this thesis has successfully completed. His careful reading of the draft, valuable comments, criticism and constructive suggestions immensely contributed to the improvement of the thesis.Iam is rendering my profound thankfulness and regards to the manager and Engineers of Amatong Tannery for their active co-operation in supplying the required samples and providing all the facilities and equipment, which enabled me to carry the research work.I expresses my sincere thanks to the Chemical Engineering Department, University of Sudan .Thanks and appreciations to my co-superviser Dr. Rawia Siddig, for her tireless support in the chemical Engineering Department.I also conveys my thanks to Engineers. Wadah, Ensaf, Ebrahim, Mohamed and all other support staffs of Amatong tannery for their services and help.

Abstract

Tanneries use much of chemicals such as sodium sulphide, calcium hydroxide, ammonium sulphate, acids, basic chromium sulphate bactericide and fungicide. All these substances contribute to the environment pollution, and although biological and chemical treatment methods are used, yet these methods are not effective enough to reduce pollution to the international standard level required. This pollution problem has to be solved completely via recycling through all wet processes from soaking to retannage.In this study the spent solutions were recycled form soaking, through retannage processes many times with addition of makeup of chemicals and water ,that are normally used , The produced crusts quality were tested and the results were found to be satisfactory.Thickness(mm)=0.8,Tensile strength (kg/cm^2) =149,Elongation at break(%)=34,Tear strength (kg/cm)=43,Load at grain crack (Kg)=20. Destination at grain crack (mm)=6.

A comparison of cost estimate of two types of tanneries one of them used conventional technology of waste treatment and the other use recycling from soaking through retannage was investigated. The method of recycling was found to be superior due to saving in water and chemicals as well as protection of environment .In addition to these advantages it is not required to establish a new effluent treatment plant which reduce the total cost of processing.It is recommended that the recycling method should be generalized in all tanneries in Sudan.

المستخلص

تستخدم المدابغ كميات كبيرة من المواد الكيميائية مثل كبريتيد الصوديوم، هيدروكسيد الكالسيوم، كبريتات الامونيوم،الاحماض،كبريتات الكروم القاعدي،مضادات البكتريا ومضادات الفطريات.كل هذه المواد تسهم في التلوث البيئي،علي الرغم من استعمال المعالجات الاحيائية و الكيمائية غير ان هذه الطرق ليست فعالة لتقليل التلوث للمستوي القياسي المطلوب.مشكلة التلوث هذه يجب ان تحل كليا بالتدوير لكل عمليات الدباغة الرطبة من عملية البلل وحتي عملية اعادة الدباغة.في هذه الدراسة تم تدوير المخلفات السائلة من البلل حتي اعادة الدباغة عدة مرات مع اضافة كميات مكملة من المواد الكيميائية و المياه التي يتم استخدامها اساسا.وقد كانت جودة المنتج مطابقة للمواصفات القياسية.السمك (مم)=0.8 ،قوة الشد (كجم/سم^2)=149،الاستطالة عند القطع (%)= 34 ،قوة تمزق الثقب (كجم/سم)=43،قوة التمزق الحبيبي (كجم)=20 ،المرونة (مم)=6.

تمت مقارنة تقديرات التكاليف لمدبغتين احداهما تستخدم الطرق التقليدية في معالجة المخلفات والاخري تستخدم طريقة التدوير خلال عملية البلل حتي عملية اعادة الدباغة وقد نتج عن ذلك ان طريقة التدوير هي الافضل بتوفير المواد الكيميائية والمياه مع حماية البيئة.بالاضافة الي هذه الفوائد فانه لاتوجد حاجة لتشييد مصنع للمعالجة مما يقلل تكلفة الانتاج الكلية.توصي هذه الدراسة بتعميم طريقة التدوير في كل المدابغ بالسودان.

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ABBREVIATIONS

BOD	Biological oxygen demand
COD	Chemical oxygen demand
W/B	Wet blue
f.o.b	Free on board
d.p	Deprecation
W.C	Working capital
FCI	Fixed capital investment
TCI	Total capital investment
TPC	Total production cost
s.v	Salvage value
MBRs	membrane bioreactors
VOCs	Volatile organic compounds
ETP	Effluent treatment process