

**PHYSIO-CHEMICAL ANALYSIS OF EXTRACTED CRUDE OIL FROM WASTE
SOLE THROUGH PYROLYSIS**

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BANGLADESH
14th May, 2016**

**PHYSIO-CHEMICAL ANALYSIS OF EXTRACTED CRUDE OIL FROM WASTE
SOLE THROUGH PYROLYSIS PROCESS**

A thesis by

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&

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This thesis report is submitted to the department of Leather Engineering, Khulna University of Engineering & Technology, Khulna, in partial fulfillment of the requirement for the degree

Of

BACHELOR OF SCIENCE IN LEATHER ENGINEERING

14th May, 2016

DECLARATION

It is here by declared that “**PHYSIO-CHEMICAL ANALYSIS OF EXTRAXTED CRUDE OIL FROM WASTE SOLE THROUGH PYROLYSIS PROCESS**” has been performed by Md: Dider Hossain &Shahanuddaula under the supervision of Adhir Chandra Paul, Lecturer, Department of Leather Engineering, KUET. Neither this thesis nor any part of it has been submitted elsewhere for the award of any degree or diploma.

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Dedicated
To
Our Beloved Parents
&
Respected Teachers

ACKNOWLEDGEMENTS

At first we present cordial thanks to Almighty ALLAH who makes us capable to complete successfully this study. It is a great pleasure for both of the authors to express unbound indebted gratitude to their supervisor Mr. Adhir Chandra Paul, Assistant professor, Department of Leather Engineering, Khulna University of Engineering & Technology, Bangladesh, for his numerous help, inspiration, valuable advice and supervision of the research project until the completion of the thesis. We are really honored for the opportunity to work under the supervision of him. We would also like to thanks Dr. Md. Abul Hashem, Assistant Professor and Head of the department, Department of Leather Engineering, Khulna University of Engineering & Technology, for his inspiration and co-operation. Grateful acknowledgements are due to the technicians of Heat Engine Laboratory of Mechanical Department, Khulna University of Engineering & Technology, for their assistance and co-operation in carrying out the study. Special thanks to Bay Footwear Ltd. in preparing sample. The Gratitude of the authors goes to the Md. Talim Hossain Mondol, R&D Officer, Bay Rubber and Md. Rafiqul Islam, Assistant Gneral Manager, Apex Footwear Ltd. for their co-operation. Also, thankful to Md. Shameem Hossain, Lecturer, Department of Energy Technology, Khulna University of Engineering & Technology for his valuable advice to complete this study.

Finally, we would also like to thank our family and friends for their encouragement and moral supports.

Authors

ABSTRACT

Energy crisis and environmental degradation are the main problems nowadays and one of the cause environmental degradation is diverse solid wastes, which are generated on regular basis. Footwear industries are a great source of waste generation by which renewable energy can be generated. Different types of materials such as leather, synthetic materials, rubber and textile are commonly used in shoe manufacturing, among them the percentage of rubber used as a form of full vulcanized or semi vulcanized is about 7% of material consumption in average shoe (%wt). Vulcanized rubber is non-biodegradable and that's why it has negative impact on environment. Pyrolysis is one of the thermal approaches to recovering energy from waste rubber. In the thesis work, thermal pyrolysis of waste soles were carried out in a manually designed pyrolytic plant in which semi vulcanized and full vulcanized rubber were processed to obtain pyrolytic oil within the temperature range of 2500°C to 3500°C. The pyrolytic oil and gas for both semi and full vulcanized rubber was increasing with the increase of temperature where char amount show opposite. A comparison was made up between the semi and full vulcanized rubber sole where better result was obtained from semi vulcanized rubber sole and the effect of temperature on the production of pyrolytic oil, gas and char were also studied. Further FTIR and TGA analysis were done to analyze the extracted crude oil physio-chemically. From the analysis it was seen that, there was presence of more functional groups and chemical bonds in the crude oil from semi vulcanized rubber and it was thermally more stable than full vulcanized rubber. The crude oil obtained from semi and full vulcanized rubber can be used for further inspection to determine whether it is fuel or not.

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LIST OF SYMBOLS

SYMBOLS

%	-----	Percent
⁰ C	-----	Degree Celsius
min	-----	Minute
SBR	-----	Styrene butadiene rubber
NBR	-----	Natural butadiene rubber
wt	-----	Weight
SRF	-----	Solid Recovered Fuel
RDF	-----	Refuse Derived Fuel
AD	-----	Anaerobic Digestion
NNFCC	-----	National Non-food Crops Centre
MJ/kg	-----	Mega joule per kilogram
cm ⁻¹	-----	per centimeter
FTIR	-----	Fourier Transform Infrared Spectroscopy
TGA	-----	Thermogravimetric analysis

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