UNIVERSITY OF ZIMBABWE

AVOCADO SEED STARCH AND CARBOXYMETHYL CELLULOSE SUPERABSORBENT POLYMER: SYNTHESIS AND CHARACTERISATION

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REGISTRATION NUMBER: R 073944L

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE MASTER OF SCIENCE DEGREE IN CHEMISTRY

2016

FACULTY OF SCIENCE

CHEMISTRY DEPARTMENT

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DECLARATION

I, KETIWE SIYADUBA, do hereby declare that this dissertation is a result of my own investigation and research, except to the extent indicated in the Acknowledgements, References and comments included in the body of the report, and that it has not been submitted in part or in full for any other degree to any other university.

…… ……..

Student Signature **Date**

…… ……

Supervisor Signature **Date**

ACKNOWLEDGEMENTS

Firstly I would like to thank God for granting me the knowledge and the capacity to learn throughout the Master of Science in Chemistry Degree programme at the University of Zimbabwe. I would like to extend my gratitude to my family and friends who were patient and assisted me as I undertook my studies.

I wish to thank Dr Nhamo, Dr Bebe and Professor Mafoti for the scientific guidance and constructive advice that steered this research project to completion.

I would like to thank the Scientific and Industrial Research and Development Centre staff particularly the Food and Biomedical Technology Institute Scientists and Interns for their support and assistance in carrying out the experimental work.

Abstract

Superabsorbent polymers (SAPs) of crosslinked avocado seed starch and carboxymethyl cellulose were synthesized and their performance as fluid absorption materials was assessed by comparing them with those made from analytical grade starch. The SAPs were characterized by water absorption capacity (WAC) tests, Fourier transform infrared spectroscopy analyses, solubility fraction tests, effects of crosslinker quantity and swelling rate were investigated to determine the suitability of avocado starch in the synthesis of SAPs.

Avocado seed starch was used in the superabsorbent polymer framework because of its biodegradability, abundance and limited use as a source of food for human consumption. The results of the research showed that the SAPs produced with avocado seed starch and those made from pure starch have comparable properties. The WAC for the avocado seed starch blend was 39g/g (3900% of the original weight) when the ratio of the avocado starch, carboxymethyl cellulose and aluminium sulphate was 88: 9.7: 2.3 respectively. The pure starch blend with a similar weight ratio had a WAC of 46.5g/g. As the amount of either starch was increased the differences between the WAC of the SAPs were less than 3.0g/g. FTIR spectra of the SAPs showed no significant differences between avocado starch and pure starch SAPs. The soluble fraction results showed that avocado SAPs had good gel formation. Analysis of experimental data by GraphPad Prism 6.0, one way Anova showed that there was no significant difference between the two types of SAPs for all the tests conducted.

Avocado seed starch can therefore be used in the synthesis of superabsorbent polymers. It can be used as a substitute for starch extracted from agricultural plants that have already been studied in detail.

Key words: Carboxymethyl cellulose, starch, superabsorbent polymer, water absorption capacity, biodegradable

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