UNIVERSITI TENOLOGI MARA

ISOLATION AND PURIFICATION OF GALACTOMANNAN FROM *LEUCAENA LEUCOCEPHALA* AND SYNTHESIS OF CROSSLINKED GALACTOMANNAN NANOPARTICLES

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Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

Faculty of Applied Sciences

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CONFIRMATION BY PANEL OF EXAMINERS

I certify that a Panel of Examiners has met on 10th September 2015 to conduct the final examination of Nurnadiah Bt Rahim on her Master of Science thesis entitled 'Isolation and purification of galactomannan from *leucaena leucocephala* and synthesis of crosslinked galactomannan nanoparticles' in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiners recommends that the student be awarded the relevant degree. The panel of Examiners was as follows:

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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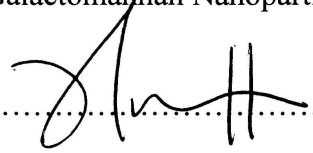
Signature of Student	:	
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ABSTRACT

These present works have focus on the isolation of galactomannan and synthesis of galactomannan nanoparticles. Galactomannan nanoparticles possess attractive properties such as biodegradable and biocompatible; significant in biomedical applications. Galactomannan was isolated from the mature seeds of a local plant, petai belalang known scientifically as *Leucaena leucocephala* via water extraction followed by precipitation with ethanol and purified by ion-exchange chromatography. It was chemically analyzed by UV, NMR, FTIR, GPC and HPLC. Pure galactomannan was successfully isolated with a yield of 50.31 % (w/w). It consisted of D-mannose and D-galactose with mannose: galactose (M/G) ratio of 1.01. The molecular weight of the galactomannan was found to be 64 kDa. Galactomannan obtained from this present work is soluble in water. Galactomannan were then modified to acrylated galactomannan (AcGA) which act as a precursor molecule for the preparation of crosslinked galactomannan nanoparticles (CL-GA). AcGA was synthesized using acryloyl chloride (AC) as a chemical modifier through esterification process. Trimethylolpropane triacrylate (TMPTA) was used as the crosslinker for the preparation of CL-GA. Successful conjugation of GA with acrylates was verified by ^{1}H NMR and FTIR spectroscopies. Thermal properties of pure galactomannan, AcGA and CL-GA were measured using DSC to complement spectroscopic results. TEM images revealed the particle size of AcGA to be in the range of 30-100 nm; and increased to 200-850 nm range after the crosslinking process. Efficiency of CL-GA to trap crystal violet dye as a model drug was followed by UV Vis Spectroscopy. Results showed that CL-GA is capable of trapping crystal violet dye and has the potential to be used as a drug carrier.

TABLE OF CONTENTS