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UNIVERSITI TEKNOLOGI MARA

**COATLESS ALGINATE PELLETS AS
DELAYED-RELEASE DRUG
CARRIER FOR INFLAMMATORY
BOWEL DISEASE TREATMENT**

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of the requirements for the degree of
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CONFIRMATION BY PANEL EXAMINERS

I certify that a Panel of Examiners has met on 6th January 2016 to conduct the final examination of Siti Hajar Binti Md. Ramli on her Master of Science thesis entitled “Coatless Alginate Pellets as Delayed-Release Drug Carrier for Inflammatory Bowel Disease Treatment” in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiners recommend that the student be awarded the relevant degree. The panel of Examiners were as follows:

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ABSTRACT

Conventional alginate pellets underwent rapid drug dissolution and failed to exert colon targeting unless subjected to complex coating. This study designed coatless delayed-release oral colon-specific alginate pellets for ulcerative colitis treatment. Alginate pellets, formulated with water-insoluble ethylcellulose and various calcium salts, were prepared using solvent-free melt pelletization technique which prevented reaction between processing materials during agglomeration and allowed such reaction to occur only in dissolution. Combination of acid-soluble calcium carbonate and highly water-soluble calcium acetate did not impart colon-specific characteristics to pellets due to pore formation in fragmented matrices. Combination of moderately water-soluble calcium phosphate and calcium acetate delayed drug release due to rapid alginate crosslinking by soluble calcium from acetate salt followed by sustaining alginate crosslinking by calcium phosphate. The use of 1:3 ethylcellulose-to-alginate enhanced the sustained drug release attribute. The ethylcellulose was able to maintain the pellet integrity without calcium acetate. Using hydrophobic prednisolone as therapeutic, hydrophilic alginate pellets formulated with hydrophobic ethylcellulose and moderately polar calcium phosphate exhibited colon-specific *in vitro* drug release and *in vivo* anti-inflammatory action. Coatless oral colon-specific alginate pellets can be designed through optimal formulation with melt pelletization as the processing technology.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

Inflammatory bowel disease such as ulcerative colitis is characterized by inflammation of intestinal mucosa [Amirshahrokhi et al., 2011; Ha et al., 2012; Hassan and Soliman, 2010]. It is considered as an autoimmune disease that affects mainly the colorectal region of the gastrointestinal tract [Ha et al., 2012; Hassan and Soliman, 2010]. The main clinical symptoms of ulcerative colitis are diarrhea, mucilage or blood-pus stools and abdominal pain [Gong et al., 2012; Ramadass et al., 2013]. The ulcerative colitis is a long known medical condition that affects mainly the western population [Oosegi et al., 2008; Ramadass et al., 2013; Thippeswamy et al., 2011]. Recent data indicates that significantly high rates of disease contraction occur among Asians with rising statistics over the years [Onishi et al., 2008; Ramadass et al., 2013]