

**SYNTHESIS AND CHARACTERIZATION OF β -CYCLODEXTRIN/ALGINATE
AEROGEL VIA CHEMICAL CROSS LINKING THROUGH SUPERCRITICAL
DRYING OF CARBON DIOXIDE**

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND STUDY

Cyclodextrine or CD is a cyclic oligosacarides molecule, which is obtained from plant starch through enzymatic degradation. The major natural CD which are α , β , γ -CD consisting 6, 7 and 8 glucopyranose units connected by $\alpha(1,4)$ -linkages, respectively. Its hydrophobic exterior and hydrophilic interior combine with its vacant interior cavity which composed of glucose residue, enable it to entrap polar molecule, in turn providing the ability to form inclusion complex with guest molecule, (Duchêne & Bochot, 2016). The inclusion complex allows the inclusion of apolar molecules or parts of molecules inside CD's interior cavity, altering their physicochemical characteristics, such as increasing the water solubility of the guest molecule, consequently, increasing its bioavailability (degree of drug absorption into human tissue), this serves as useful features of CD as drug carrier and drug enhancer. β -CD in particular, has the best aptitude for inclusion of drug molecules because it undergoes B type complex due to its low water solubility which is 18.5 g/L apart from its family α , and γ -CD who tend to undergo A type complex due to its high solubility which is 145, and 232 g/L respectively (Duchêne & Bochot, 2016). In short, the usage of cyclodextrin in pharmaceutical formulation and drug delivery system are still relevant and an effective method because it can further enhance the solubility, and chemical stability of drugs molecules (Loftsson, Brewster, & Masson, 2004; Stella & Rajewski, 1997) combine with its low toxicity nature and biodegradability, as it is derived from plant's starch (Duchêne & Bochot, 2016).

Alginate or alginic acid is an anionic hydrophilic polysaccharides copolymer that can be found in abundance in the cell wall of brown algae. In the presence of water, alginate forms gel like structure due to ionotropic gelation where cationic