

# Pharmaceutical Technology Perspectives

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Muhammad Taher



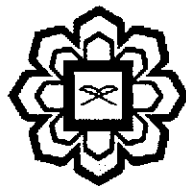
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# **Pharmaceutical Technology Perspectives**

*Editor*

*Muhammad Taher*



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## CHAPTER 9

# USE OF CYCLODEXTRIN IN THE PRODUCTION OF BIOMEDICAL NANO PARTICLES

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*Cyclodextrins are polymeric compounds whose monomer is glucose. Most common cyclodextrins are formed of 6, 7 or 8 glucose units, having a conical structure which is hydrophobic from inside and hydrophilic from outside. With this structure, they play a catalytic role in the production of emulsion polymers, significantly increasing the rate of the polymerization process. Cyclodextrins have improved the production of a number of commercially produced polymers, yet more research is still required to uncover the full potential of such compounds.*

### 9.1. Introduction

The three “parent cyclodextrins (CDs)” are the oldest discovered and most well known CDs, the  $\alpha$ -CD molecule is a ring formed of 6 glucose units,  $\beta$ -CD is formed of 7 and  $\gamma$ -CD is formed of 8 (Fig. 9.1). Historically CDs were first referred to in 1891 as a result of digesting starch with *Bacillus amylobacter*.  $\alpha$ -CD and  $\beta$ -CD were first separated and distinguished in 1911, while  $\gamma$ -CD was first discovered in 1948 (Szejtli *et al.*, 1996). Because of the non-poisonous, semi-natural nature of CDs on one hand, and the advancements of genetic engineering on the other hand, more enzymes were discovered that make the production of highly pure CDs possible. In 1970, the cost of 1 kg of  $\beta$ -CD was US\$ 2000; it was considered a rare chemical. Today the bulk price of 1 kg of  $\beta$ -CD is US\$ 5, and the yearly production is around 10,000 tonnes (Loftsson *et al.*, 1998).