Exploiting Me-β-Cyclodextrin Host-Guest Complexation for Obtaining Water-Borne UV-Curable Coatings

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Cyclodextrins are a category of cyclic oligosaccharides constituted by 6, 7 or 8 glucopyranose units linked together by α-1,4 bonds, obtaining a toroidal structure that will be called α-CD, β-CD or γ-CD, respectively[1-3]. This molecular structure defines the presence of a cavity characterised by not only a specific diameter and size, but also by an amphiphilic behaviour. In fact, while the outside is hydrophilic due to the presence of hydroxyl groups, the inside is hydrophobic, so the latter could receive organic guest molecules in order to form water-soluble inclusion complexes[3-4]. This characteristic, together with other advantages such as low toxicity, high biodegradability, biocompatibility, versatility and availability[2], make this family of compounds eligible to be used in the production of UV-curable polymers. In fact, the advantages of the cyclodextrins could be combined with the low VOC emissions, high efficiency and low energy consumption of the UV curing process in order to produce polymeric materials such as coatings, adhesives and inks in a more environmentally friendly way[5]. This study focuses on the utilization of a Me-β-CD derivative for complexing oil-soluble monomers and photoinitiators in water, aiming to achieve UV-cured coatings with adjustable mechanical and optical properties.

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