



Additive Effects in Radiation Grafting and Curing

Visay Viengkhou¹, Loo-Teck Ng¹ and John. L. Garnett²

¹ Department of Chemistry, University of Western Sydney, Nepean, Kingswood, NSW 2747.

² Radcure Australia Inc, Department of Chemistry University of Western Sydney, Nepean, Kingswood, NSW 2747.

Detailed studies on the accelerative effect of novel additives in radiation grafting and curing using acrylated monomer/oligomer systems have been performed in the presence of ionising radiation and UV as sources. Methyl methacrylate (MMA) is used as typical monomer for these grafting studies in the presence of the additives with model backbone polymers, cellulose and polypropylene. Additives which have been found to accelerate these grafting processes are: mineral acid, occlusion compounds like urea, thermal initiators and photoinitiators as well as multifunctional monomers such as multifunctional acrylates.

The results from irradiation with gamma rays have also been compared with irradiation from a 90W UV lamp. The role of the above additives in accelerating the analogous process of radiation curing has been investigated. Acrylated urethanes, epoxies and polyesters are used as oligomers together with acrylated monomers in this work with UV lamps of 300 watts/inch as radiation source. In the UV curing process bonding between film and substrate is usually due to physical forces. In the present work the presence of additives are shown to influence the occurrence of concurrent grafting during cure thus affecting the nature of the bonding of the cured film. The conditions under which concurrent grafting with UV can occur will be examined. A mechanism for the accelerative effect of these additives in both grafting and curing processes has been proposed involving radiation effects and partitioning phenomena.