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Section I : Structure related studies

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After the discovery in the 60's, by research workers in the U.S., that addition of small amounts of plasticizer to a glassy polymer increases the modulus over the temperature range between the glass and melt transitions (from which the term antiplasticization derives), the author pursued these studies and unveiled the time-dependent nature of the phenomenon, from creep experiments. He has later demonstrated that the yield strength of the polymer is affected in a similar way to the modulus, and it was established that the reduction in toughness resulting from antiplasticization is due to the lowering of the critical crazing strain.

Much later this work was extended to examine the interaction of water in an epoxide network and in corresponding epoxide/monomer add: IPN. The strong association of water with the highly polar groups within an epoxide network causes plasticization and antiplasticization phenomena, in all glass polymers, to an extent that is only limited by the constraints arising from the surrounding matrix. Evidence for the fast uptake of sorbed water, "free" and "bound", has been obtained from vibration spectroscopy analysis and the evidence of an interpenetrating polymer network, on mass transport phenomena was established.

Some of the studies, related to antiplasticization, were also carried out with respect to fracture