

INFLUENCE OF HYDROGEN BONDING ON THE PROPERTIES OF ELASTOMERS AND ELASTOMER BLENDS

R. Stadler and J. Burgert

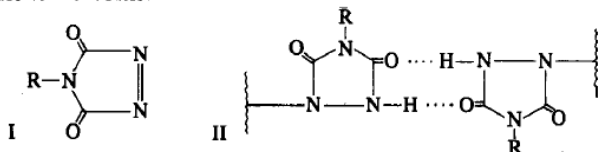
Institut für Makromolekulare Chemie der Universität Freiburg

Polymers of different chemical structure are not miscible in general only in few cases, by the presence of a specific interaction, thermodynamic miscibility is achieved, i.e. in the Polystyrene – Polyvinylmethylether – system.

In many technological important systems like natural rubber/polybutadiene phase separation can generate problems in the processing of these materials.

The present approach to get a partial miscibility between natural rubber and polybutadiene starts in the modification of these two polymers.

By reaction of 1,2,4-Triazoline-3,5-diones (I) with olefinic doublebonds urazole groups (II) are incorporated to diene-elastomers.



The urazole groups have the tendency to form hydrogen bonds. The effect of this secondary valences on the dilute solution properties has been investigated. From solution viscosity, GPC and light scattering experiments the formation of inter and intramolecular hydrogen bonds can be deduced. The intra-molecular hydrogen bonds decrease the dimensions of the polymer chain and thus reduce the viscosity.

From GPC it can be concluded, that even in very dilute solution polymeric aggregates are existent.

In polar solvents the stability of the hydrogen bonds is decreased. From IR-spectroscopy and DSC-measurements information can be drawn about the properties of the hydrogen bonds on the bulk behaviour.

It can be shown, that the use of these strongly interacting groups can be used to compatibilize nonmiscible polymers like Polybutadiene and Polyisoprene.

KINETIC STUDIES OF THE CROSSLINK REACTION OF POLYBUTADIENE

L.L. Freitas, M.M. Jacobi, M.A. de Araújo and R. Stadler

Instituto de Química – UFRGS

The kinetics of the solution crosslinking reaction of Polybutadienes using 4,4'-(4,4'-diphenylmethylene)-bis-1,2,4-triazoline-3,5-dione as crosslinking agent is investigated.

The consumption of crosslinker is detected by measuring the different measurements. The consumption of crosslinker is detected by measuring the different measurements. The consumption of crosslinker is detected by measuring the different measurements.

Further simplification arises from the specific properties of the crosslinker. As a consequence the reaction at low conversions is described by one first order equation.

At high conversions deviations from this simple kinetic behaviour are observed. The reaction becomes slower. The onset of the deviations depends on the primary molecular weight as well as on the concentration of the polymer and crosslink agent. To describe the slow-down of the reaction in a more quantitative way a Retardation function is introduced. This function allows a direct comparison of

the $n-\pi^*$ -absorption of the Triazolinedione ring system in the visible region.

The process is a series of second order reactions. According to the large excess of double bonds the kinetic simplification is given.

From calculations of the unperturbed dimensions of the polymer chains the degree of interpenetration between polymer coils is estimated as a function of molecular weight and concentration of the polymer.

These calculations give an estimation whether gelation can take place or not. A qualitative correlation between the degree of interpenetration and the shape of the Retardation function is given.

Acknowledgements: FINEP, CNPq, STIFTUNG VOLKSWAGENWERK