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Blends of poly (vinylidene fluoride) with stereoregular poly (akyl methacrylate) s

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SUMMARY

This thesis describes various aspects of polymer-polymer blends of poly(vinylidene fluoride) (PVF_2) with stereoregular poly(alkyl methacrylate)s, like mutual miscibility, nature and size of the interactions between the complementary polymers, Lower Critical Solution Temperature (LCST) behaviour, complex formation and template polymerization.

In chapter 1, a more or less general treatment of polymer-polymer compatibility is given, including the basis of the new "Equation of State" theory.

From chapter 2, it appears that PVF_2 is completely compatible with isotactic(it-), atactic (at-) and syndiotactic (st-) poly(methyl methacrylate) (PMMA) in the molten state. Measurements of the melting point depression of PVF_2 point to a stronger interaction of PVF_2 with it-PMMA than with st-PMMA.

In chapter 3, more attention is paid to the nature of the interaction between PVF_2 and PMMA. Computerized infra-red measurements demonstrate that a specific dipole-dipole interaction involving the carbonyl groups of PMMA is characteristic for this system, especially for blends of PVF_2 with it-PMMA.

In chapter 4, the mixing behaviour is described of blends of PVF_2 with it-, at- and st- poly(ethyl methacrylate) (PEMA). PVF_2 appears to be completely compatible with both at- and st-PEMA in the molten state. Blends of PVF_2 with it-PEMA however, exhibit liquid-liquid phase separation upon raising the temperature. This so-called LCST behaviour was already predicted for polymer-polymer

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In chapter 5,
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Chapter 6 desc
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of PVF_2 are describe
complex formation be
the mutual interacti
growing PMMA chain a
template polymerizat

Finally, in th
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d.s.c. scan.

blends on theoretical grounds, but was only observed in a few blends. The PVF_2 /it-PEMA system is the first one in which this type of liquid-liquid phase separation is perceptible without application of artifices like radioaction, or something alike.

In chapter 5, the experimental cloud point curve of blends of PVF_2 with low molar mass it-PEMA is compared with a spinodal, computed with Flory's "Equation of State" theory. It is observed that the critical concentration lies at the PVF_2 side of the phase diagram, both with low and high molar mass it-PEMA. The "Equation of State" theory can indeed account for the asymmetry of the critical concentration in blends of PVF_2 with low molar mass it-PEMA.

Chapter 6 described the mixing behaviour of PVF_2 and PMMA in common solvents. Also in this chapter, some polymerizations of methyl methacrylate (MMA) in the presence of PVF_2 are described. Although some indications for complex formation between PVF_2 and it-PMMA were obtained, the mutual interaction in solution between PVF_2 and the growing PMMA chain appears to be too weak to achieve template polymerization.

Finally, in the appendix a description is given of the multiple melting behaviour in blends of PVF_2 with the three stereoisomeric forms of PMMA. This phenomenon can be attributed partly to recrystallization of PVF_2 during a d.s.c. scan.