

University of Groningen

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

Roerdink, Eize

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:

1980

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Roerdink, E. (1980). *Blends of poly (vinylidene fluoride) with stereoregular poly (akyl methacrylate) s*. s.n.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

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

blends on theoretical grounds for a few blends. The PVF_2 side of the phase diagram, which this type of interaction is not perceptible without action, or something

In chapter 5, blends of PVF_2 with PMMA are described on a spinodal, computed from the Flory-Huggins theory. It is observed that the LCST is at the PVF_2 side of the phase diagram. The high molar mass it-PMMA can indeed account for the observed behaviour. The concentration in blends

Chapter 6 describes the template polymerization of PMMA in common solvents. The template polymerizations of methyl methacrylate of PVF_2 are described. The complex formation between PVF_2 and the mutual interaction between the growing PMMA chain and the template polymerization

Finally, in chapter 7, the multiple melting of the blends of PVF_2 with PMMA is described. The three stereoisomeric melting peaks are attributed partly to the d.s.c. scan.

blends on theoretical grounds, but was only observed in a few blends. The PVF₂ /it-PEMA system is the first one in which this type of liquid-liquid phase separation is perceptible without application of artifices like radio-action, or something alike.

In chapter 5, the experimental cloud point curve of blends of PVF₂ 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 PVF₂ 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 PVF₂ with low molar mass it-PEMA.

Chapter 6 described the mixing behaviour of PVF₂ and PMMA in common solvents. Also in this chapter, some polymerizations of methyl methacrylate (MMA) in the presence of PVF₂ are described. Although some indications for complex formation between PVF₂ and it-PMMA were obtained, the mutual interaction in solution between PVF₂ 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 PVF₂ with the three stereoisomeric forms of PMMA. This phenomenon can be attributed partly to recrystallization of PVF₂ during a d.s.c. scan.