

Editorial corner – a personal view Polymers and ‘strange’ liquids

Gy. Bánhegyi*

Polygon Consulting, Arany János u. 28., H-1153 Budapest, Hungary

Interactions of polymers and liquids have been intensively studied since the beginning of polymer science and these investigations contributed significantly to our understanding of polymer structure, conformation and thermodynamics. There are two classes of liquids, however, which may raise new questions and promote new research leading to new understanding in this field, namely *ionic liquids* and *supercritical fluids*, more specifically *supercritical water*. Both classes of ‘strange liquid’ have been developed, studied and used widely in the so-called ‘green chemistry’ movement in the last decades of the 20th century.

Ionic liquids are true ionic compounds with bulky, non-symmetric (mostly nitrogen based organic) cations and special (mostly perfluorinated inorganic) anions having a melting point below, or in the neighborhood of room temperature. They have extremely low vapor pressure, can be relatively easily recovered, they are non-flammable and heat resistant. Ionic liquids can be used as reaction media for polymerization, but they can dissolve and/or swell certain polymers and can be used as plasticizers even with medium polarity polymers as e.g. poly(methyl methacrylate). Polymer gels swollen with ionic liquids may be used as solid polymer electrolytes. Ionic liquids can be trapped in crosslinked polymers by *in situ* polymerization or even built into the polymer network. As polymerization media, they can be used in living polymerization or in polymer-analogous reactions.

Supercritical (*sc*) fluids, as special kinds of low viscosity liquids with adjustable solution power have

already been with us for decades and the uses of *sc* CO₂ ($p_{cr} = 73$ bar, $T_{cr} = 304$ K) as reaction or extraction medium have become well known in the ‘polymer community’. As patents show *sc* CO₂ may provide an alternative solution to melt or solution blending in the preparation of nanocomposites as well. Here, however, I would like to draw the readers’ attention to *sc* H₂O, supercritical water ($p_{cr} = 221$ bar, $T_{cr} = 647$ K), as a special medium for controlled polymer recycling and degradation. The dielectric permittivity and the ion-product of *sc* H₂O can be varied within wide limits by adjusting the pressure and temperature which makes possible the degradation of biomass and polymers within seconds even in the absence of catalysts! This feature is especially important with crosslinked resins, rubbers, which cannot be recycled in the molten state. According to the Chemical Abstracts the patenting and publication activity of Asian countries is especially high in this area.



Dr. György Bánhegyi
Member of Executive Editorial Board

*Corresponding author, e-mail: gybanheg@t-online.hu
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