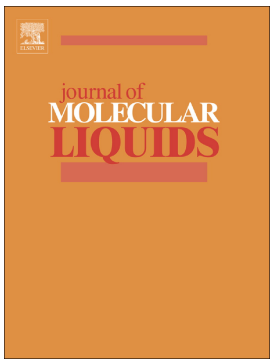

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Influence of hydrocarbon moieties of partially fluorinated *N*-benzoyl thiourea compounds on their gelation properties. A detailed rheological study of complex viscoelastic behavior of decanol/*N*-benzoyl thiourea mixtures

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Abstract

The gelation ability of a series of partially fluorinated *N*-benzoyl-*N'*-aryl thiourea derivatives (BTUs) newly designed and synthesized was examined in six different alcohols (ethanol, 1-propanol, 2-propanol, 1-butanol, 1-octanol and 1-decanol). After a general assessment through the test-tube inversion method and polarizing optical light microscopy, the viscoelasticity of two different types of decanol-BTU systems (**1a** and **1b**) was investigated *via* dynamic rheology in the 15-70^{0}C temperature range and 0.25-100 Hz frequency domain. A complex different behavior was evidenced for each of these mixtures, mainly due to the completely different morphologies resulted during gel formation and clearly illustrated trough scanning electron microscopy (SEM), even though the structural difference between the two BTUs **1a** and **1b** is minor (longer alkyl chain for latter). To explain how the gelator molecules **1a** and **1b** self-assembly to gellify the decanol, a structural mechanism has been proposed relied on their rheological behavior, on one hand, and the findings revealed by differential scanning calorimetry (DSC), polarizing optical light microscopy (POM), infrared spectroscopy (FT-IR - ATR), powder X-ray scattering (XRD) and SEM, on the other hand.

Keywords*: N-benzoyl thiourea derivatives, organogels, gelation, rheology, thixotropy*

1. Introduction

Gel or gel-like behavior and supramolecular self-assembling go usually hand-to-hand. Depending on the adequate concentration of gelator, called critical gel concentration (CGC) [1-3], at a certain temperature (usually at room temperature), and the nature of interaction between the gelator molecules, there are two main kinds of gels: chemically crosslinked, always thermally irreversible, and physically (non-covalently) crosslinked that can be or not thermoreversible [4,5]. Except for a few cases, physical gels are practically thermoreversible, generally, the gel state vanishing upon heating and then coming back to itself on cooling. Nevertheless, when the binary mixture gelator-solvent is characterized by a lower critical solution temperature, the gel state appears on heating and melts on cooling [5], as with pluronics in water [6-8].