

# THE RHEOLOGY OF BINARY MIXTURES OF HIGHLY CONCENTRATED EMULSIONS

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The binary mixtures of highly concentrated water-in-oil emulsions of 0.85 volume fraction with different droplet size ratios were prepared in this work. 60wt.% ammonium nitrate solution, hydrocarbon oil and PIBSA-based surfactant were used to make emulsions. Generally speaking, the observed size dependencies of rheological parameters are monotonous regardless whether the size distribution is wide or narrow. However, we have found that the dependence of the rheology on the relative content of components in binary mixtures demonstrates rather unusual behaviour. The yield stress and storage modulus plateau of investigated binary mixtures of different droplet size ratios showed a negative deviation from the mixing rule. This effect was more pronounced when droplet size ratio exceeded 6 where droplet size distributions of two components were overlapped only about 5%. The yield stress and plateau of storage modulus of this binary mixture with 20% of small droplet size was practically absent in contrast to the viscoplastic behaviour of initial fractions. The gel-like behaviour of highly concentrated emulsions is usually attributed to the formation of compressed droplets in emulsions, which is absent in the binary mixtures with droplet size ratio of more than 6 due to a possibility for volume to be filled with spherical droplets of different size.