

D-13

DETERMINATION OF PARTICLE SIZE DISTRIBUTION IN PERFLUOROCARBON EMULSIONS

Michael Kupfer*, Klaus Gast, Dietrich Zirwer and Hasso Meinert

Zentralinstitut für Anorganische Chemie and Zentralinstitut für Molekularbiologie der Akademie der Wissenschaften der DDR, 1199 Berlin-Adlershof, Rudower Chaussee 5 (G.D.R.)

The application of oil/water-emulsion of perfluorocarbons (PFC) as oxygen-carrying media for medical purpose requires the consideration of several prerequisites. For instance, the emulsion must not contain particles with a diameter larger than 400 nm. Otherwise, the reticuloendothelial system is blocked quickly by larger particles showing toxic effects. Therefore, a method is desirable which makes possible a fast determination of particle size and size distribution. Measurements of PFC-emulsions have shown that the desired informations can be obtained from dynamic light scattering. The experimental autocorrelation function yields a mean particle diameter and some information about the polydispersity of the emulsion. Moreover, performing the inverse Laplace transformation of the autocorrelation function by the method of Provencher (1), the size distribution of the scattering particles in the emulsion can be evaluated. In this connection, a model for light scattering of PFC-particles with surfactants like Pluronic F-68 was developed, which is based on PFC-spheres enveloped by a surfactant layer. The thickness of this layer can be assumed to be in the range from 5 to 10 nm. The above-mentioned technique has been used for the characterization of several PFC-emulsions. The influence of temperature, time of storage and additives have been investigated. First conclusions of conditions which influence flocculation and coalescence, respectively, are drawn. The results are compared with others known from literature.

1 S.W. Provencher, Makromol. Chem. 180, (1979) 201.