

Diethylsulfoxide versus Dimethylsulfoxide: Properties and Biomedical Applications

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Abstract : Our systematic studies of diethylsulfoxide (DESO), the nearest homologue of dimethylsulfoxide (DMSO), reveal new physicochemical features. DESO has already received worthy biomedical applications: in some cases even are more pronounced compare with DMSO. The several important physicochemical characteristics of DESO including aqueous solutions have been verified and first reported: melting point of pure substance, density, dielectric relaxation data, vapor pressure and volumetric properties. Analysis of the complete vibrational spectra also leads to the conclusion that very strong interactions take place between DESO and water, even stronger than those between DMSO and water. The simultaneous existence of strong DESO-H₂O and DESO-DESO interactions suggest the coexistence of many types of structural molecular aggregates, the presence of which plays a significant role also in diluted water solutions. Our recent investigations have shown that aqueous solution of DESO could provide amorphous, glassy systems, thus avoiding ice crystallization, in a wide range of concentrations and even at very low cooling rates. The ability of DESO to act as an effective cryoprotectant on E. coli survival was also studied and compared with other commonly used cryoprotective agents. The results also confirm that DESO, more than DMSO, is able to penetrate living tissues without causing significant damage.

Keywords : diethylsulfoxide, dimethylsulfoxide, cryoprotectant, properties

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