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A Surface Free Energy Study of Hydrophobic Rice Husk Ash (RHA)-Derived Aerogels using Trimethylchlorosilane (TMCS) as Silylating Agent

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ABSTRACT

The surface free energy of a solid determines the surface and interfacial behaviour in processes such as wetting and adhesion, which is critical for silica aerogels in organic liquid absorption and chemical transport at the nanoscale for biotechnological applications. The study showed that by modifying the surface of rice husk ash (RHA) derived silica aerogels using TMCS silylating reagents at various concentrations, the surface free energy can be controlled in a wide range from -141.90 to 56.96 mJ/m2. Increases in the concentration of silylating reagent resulted in an increase in hydrophobicity for RHA derived silica aerogels, according to FTIR. This results in a decrease in surface free energy from 5.5892 to 0.3073 mJ/m2 while increasing the contact angle for water from 20 to 140. Because there is no direct way for estimating the surface energy of RHA silica aerogels, The study employed Neumann's equation of state.

Keywords: *Silica Aerogels; Rice Husk Ash; Surface Free Energy; Hydrophobic; TMCS*