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Sweet manoeuvre for improving the Diels–Alder reaction

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Diels-Alder reaction is one of the most important C-C bond forming reactions used widely by synthetic chemists. Conventionally, Diels-Alder reaction has been carried out in organic solvents. However, the past few years have witnessed an increasing concern over the environmental hazards posed by the commonly used volatile organic solvents. This has lead to the use of 'green solvents' like water, ionic liquids, supercritical fluids, new supersaturated solvent (NSS) etc. for carrying out many organic transformations.

A detailed kinetic investigation of the Diels-Alder reaction of cyclopentadiene with a variety of acrylates was undertaken. A comparative study indicates that Diels-Alder reactions are faster in NSS than in water, ionic liquids and organic solvents. Effect of individual components in NSS and viscosity study in accordance with kinetics in aqueous unsaturated, saturated and supersaturated solvent provide the importance of H-bonding characteristic. Again, temperature dependent kinetic data suggest that highly viscous nature of the NSS in fact enhance the rate of reaction through vibration activation collision controlled regime, as compared to water and ionic liquid. In addition, the high H-bonding capacity of NSS also cannot be ruled out. The work is the first experimental evidence of the fact that NSS is the solvent of choice for promoting Diels-Alder reactions.

