

585f Sulfoxide Solvents and Surfactants for Facile Separations

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We show that thirane oxide combines reactions with separations by providing a reaction medium with a built-in switch for solvent removal. Dipolar, aprotic solvents such as DMSO have the ability to dissolve both salts and organics, making them viable solvents to homogeneously run reactions that alternatively must be run heterogeneously with a phase transfer catalyst. In these cases, product isolation is often difficult as DMSO has a high boiling point and its solubility with other organic solvents makes liquid extraction difficult. Thirane oxide represents the cyclic analog to DMSO and has solvent properties that are similar to DMSO; however, thirane oxide undergoes thermal decomposition at elevated temperatures to form ethylene and SO. The cleavable nature of this solvent allows for separation and product purification at conditions that are milder than we could otherwise achieve. We have demonstrated the versatility and separation advantage of this cleavable solvent using example reactions.

Using similar chemistry, we have developed a cleavable surfactant, n-octyl thirane oxide, which is composed of a thirane oxide headgroup and an alkyl tail. The surfactant is thermally degradable enabling the irreversible breaking of an emulsion with temperature and a two phase separation at ambient temperatures. This work demonstrates a novel approach to coordinate synthesis and separation by designing a reaction media that will facilitate both.