Homogeneous Catalyst Recycling Using Switchable Water

Biphasic catalysis offers a means of achieving homogeneous catalysis while providing facile isolation and recycling of the catalyst. In aqueous/organic biphasic systems reactions can suffer from slow reaction rates due to mass transfer and partitioning issues due to the often low water solubility of the reagents. Using the previously developed switchable water\(^1\), a CO\(_2\)-switchable ionic strength aqueous solvent, catalysis can be performed in a single phase organic/switchable water co-solvent, eliminating mass transfer and partitioning issues. After catalysis, the introduction of CO\(_2\) into the system raises the ionic strength of the solution, salting out the product-containing organic phase away from the catalyst-containing aqueous phase, affording a biphasic separation. Removal of CO\(_2\) from the aqueous phase regenerates the low ionic strength form of the solvent allowing for the addition of fresh solvent and reagents and recycling of the catalyst.\(^2\) This system along with several other industrially relevant applications of switchable water will be discussed.
