Improving Switchable-Hydrophilicity Solvents: An Exercise in Molecular Design

Switchable-Hydrophilicity Solvents (SHS) are solvents that exist in two states, one which is completely miscible with water and one which is poorly miscible with water, and can be switched between these states by the addition or removal of CO₂. This unique behaviour allows SHS to be separated from hydrophobic solutes without distillation, eliminating the need for volatility in these solvents. As a result, SHS have the potential to be significantly less hazardous to humans and the environment than traditional volatile organic solvents. However, the first examples of SHS did not capitalize on this potential advantage. I will discuss improvements made in SHS safety and performance brought about by designing new SHS. With each new compound and each new piece of information, we have moved closer to our goal of designing the best possible SHS by improving their performance and decreasing their hazards.