

Aqueous Reactions Utilizing the Properties of Water

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Recently, much attention has been paid for organic reactions in aqueous media because of environmental and safety reasons. In addition, aqueous organic reactions have become popular due to easy separation of products and efficient recovery of rare metal catalysts. Besides such environmental or technical aspects, however, water has profound effects on the chemical reactivity, selectivity, and reaction pathway. Our research aims to develop innovative reaction systems based on specific characteristics of water rather than to substitute water for organic solvents.

One of characteristics of water is insolubility of hydrophobic organic molecules. This has been regarded as a disadvantage of water as the solvent for organic reactions. However, this unique property of water can be an advantage. We have proposed that an aqueous–organic biphasic system offers highly diluted reaction conditions without the use of a large quantity of solvents or slow addition technique. In the aqueous–organic biphasic system, macrocyclization via a rhodium-catalyzed $[2 + 2 + 2]$ cyclotrimerization of triynes can be carried out easily and efficiently.

The aqueous–organic biphasic system also enables efficient synthesis of macrocyclic lactones via an intramolecular Tsuji–Trost reaction.

References

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