화학과 특별세미나

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Biocatalysis for Better Chemical Sustainability: The Manipulation of Organosilicon Compounds and Greener Oxidations

In recent years there has been increasing interest in the application of enzymes for synthetic chemistry. Such biocatalysts promise more sustainable routes towards the synthesis of small organic molecules and are now well established in the production of fine chemical building blocks (e.g. for pharmaceuticals, agrochemicals). Here, we present two examples from our laboratory working towards these topics.

In the first case, we report our investigations of the silicatein enzymes for the synthetic manipulation of Si-O bonds in a range of organosiloxanes. Here, we outline their general properties and efforts towards understanding their mechanism; and demonstrate Si-O bond hydrolysis and condensation with a range of synthetic organosilanols and silyl ethers. Finally, initial efforts at the enzymatic synthesis of polysiloxane “silicone” polymers are reported.

In the second case, we present our work utilising enzymatic oxidations and quantifying their sustainability. As an example, the synthesis 1,4-benzoxazines is demonstrated in this “one-pot, two-step” procedure, involving in situ quinone imine formation followed by a [2+2] cycloaddition. Subsequent analysis of the various Green Chemistry metrics showed this biocatalytic route was approximately twice as sustainable compared to the conventional purely chemical route.

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Host : 연세대학교 화학과