Biocatalytic aza-Michael addition of aromatic amines to enone using α-amylase in water

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The Michael addition of amines with enones for synthesizing β-amino carbonyls constitutes a valuable transformation in organic chemistry. While various catalysts have been made available for catalyzing the Michael addition of aromatic amines to enones but there is no report of using α-amylase enzyme to catalyze this transformation. The α-amylase from Aspergillus oryzae was found to catalyze the Michael addition of various aryl (hetero) amines to methyl vinyl ketone with high catalytic efficiency (63–83% yield). A hybrid of α-amylase with copper nanoparticle (α-amylase@CuNPs) has been prepared and used to catalyze this transformation as a reusable catalyst. Further, an application of α-amylase catalyzed aza-Michael addition in the cascade reactions has been exhibited by synthesizing biologically important 3-acetyl quinoline. In addition, molecular docking and Molecular Dynamics (MD) simulation studies are carried out to get insight into the key interactions of the substrates with the amino acid residues near the active site and the probable reaction mechanism, which reveals that Glu230 and Asn295 play a crucial role in the substrate activation process.

Keywords: Aza-Michael, Biocatalyst, Aromatic amines, Copper nanoparticles, Reusability, Green synthesis.

Biography

Sunil Dutt was born in Karnal, Haryana, India and graduated with B.Sc. from Government P.G College Karnal, Haryana, India. He received his B.Ed. degree with specialization in Science and Mathematics in 2010 from Kurukshetra University Kurukshetra (Ch. Matu Ram college of Education, Jainpur Jattan, Ladwa, Kurukshetra, Haryana, India). He obtained his M.Sc. degree with a specialization in Organic chemistry in 2012 from Maharishi Markandeshwar University, Mullana, Ambala, India. Further, he joined as Chemist (2012-2013) in the Piccadilly Agro-industry, Bhadson, Karnal, Haryana (India). Next, he joined the School Lecturer (2013-2015) at Sir Chhotu Ram Senior Secondary School, Karnal Haryana. Further, he joined the Assistant Professor (2015-2018) at Dyal Singh College Karnal, Haryana (India). Further, he joined his PhD in 2018 under the supervision of Dr. Vikas Tyagi at Thapar Institute of Engineering and Technology, Patiala, India and where he is focusing on enzyme-catalysed non-natural organic transformations.

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