

New Greener Solvent

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Merck, a science and technology company, launched Cyrene – a sustainable dipolar aprotic solvent, produced in two steps from a renewable cellulose source. The bio-derived alternative was created in response to the need for solvents to meet stricter regulation requirements for both employee safety and environmental sustainability. The new product targets the rising demand for greener alternatives to Dimethylformamide (DMF) and N-Methyl-2-pyrrolidone (NMP).

“With a strong focus on green chemistry, Merck is dedicated to providing today’s scientists with innovative solutions to help solve environmental challenges before us. As a greener alternative, Cyrene solvent allows our customers to improve the safety of their processes and reduce the environmental impact of their research and manufacturing – without compromising performance.”

Klaus Bischoff, head of Research Solutions, Life Science at Merck

The Life Science business of Merck uses the 12 Principles of Green Chemistry that were developed and published by thought leaders Paul T. Anastas and John C. Warner in 1991 as a framework for its Green Chemistry practice.

DMF and NMP are under increasing regulatory restrictions, with both being classified by the European Union’s Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) as substances of very high concern. More recently, according to the European Union, the European Commission added NMP to the restricted substances list known as REACH Annex XVII – driving the demand for alternatives. Additionally, effective May 2020, consumer products containing more than 0.3 percent NMP will be prohibited in the European Union. Initial studies and testing have found Cyrene solvent to be a more sustainable, safer option when compared with DMF and NMP.

Cyrene solvent was developed as a result of a partnership between the University of York’s Green Chemistry Centre of Excellence (GCCE) and Circa Group. Utilizing its expertise in green chemistry, the University of York’s GCCE worked to determine potential applications for the Cyrene solvent.

“Cyrene solvent actually outperformed the solvent we currently use for manufacturing graphene – providing us with both a sustainable and more effective option to traditional solvents,” said James Clark, professor, University of York and director, Green Chemistry Centre of Excellence.

Merck also researched alternate uses of Cyrene solvent in mild and robust Sonogashira cross-couplings, a common reaction used in medicinal chemistry, with Professor Allan Watson’s group at the University of St. Andrews, United Kingdom.

“It was important for us to find a safer alternative without sacrificing quality,” said Allan Watson, reader in Homogeneous Catalysis, University of St. Andrews. “Through our research, we found that Cyrene solvent features similar physical properties to those of DMF and other dipolar aprotic solvents, while enabling medicinal chemists to execute a more sustainable chemical synthesis.”

Cyrene solvent was also substituted for DMF in amide couplings – a fundamental reaction in drug discovery. By demonstrating that safer, greener alternatives offer superior performance, Cyrene solvent was recognized as the Bio-Based Chemical Innovation of the Year at the 2017 European Bio-Based Innovation Awards.