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Professor Emphasizes Importance of Chemistry's 'Hot Topic' on an International Stage

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Ram Mohan

BLOOMINGTON, Ill. – Illinois Wesleyan University associate professor of chemistry Ram Mohan is helping fellow chemists worldwide. Mohan's lab is part of a team exploring processes in a new class of solvents.

Mohan and his sabbatical host, Dr. Janet Scott of The Center for Chemistry in Monash University, Australia, recently published a review of the reactivity of ionic liquids. Ionic liquids have been a hot, new topic in chemistry over the last several years. Industrial scientists at such companies as BASF and Merck have been integrating ionic liquids into their work, looking for safer ways to produce chemicals. "Ionic liquids are opening doors for industry," said Mohan, who has been working with the liquids for the past two years. "Companies are developing new uses of ionic liquids, such as lubricants and batteries."

In the past, reviews on ionic liquids have focused on their role as a reaction medium. "This is one of the first comprehensive reviews that focuses on the possibility that ionic liquids can participate in reactions and give unexpected products," said Mohan.

Most people are familiar with ionic compounds, the most common being table salt. Ionic liquids are a similar substance that remain in liquid form at room temperature. "In order to have salt be a liquid, you would have to heat it up to 800 degrees," said Mohan. "With ionic liquids, you are talking about the same type of substance, but they are liquid without having to heat them." Traditional organic solvents are volatile and pose a respiratory hazard, but ionic liquids are practically non-volatile and do not pose a respiratory hazard.

Until now, chemists assumed ionic liquids were simply a medium for reactions, much like a football field where the action occurred. Mohan, Scott, a leading international expert on ionic liquids, and Shahana Afrose Chowdhury, a Ph.D. student at Monash University of Melbourne, Australia, were invited to write the review in a leading international chemistry journal, *Tetrahedron*. "Several reports in the literature have clearly shown that ionic liquid participates in chemical reactions," said Mohan. That means chemists who work with them may be getting unexpected products in their reactions. "The study helps them better understand what they are working with," said Mohan.

The review is especially helpful because it saves chemists the cost of redoing reactions with expensive ionic liquids and allows them to pick a suitable ionic liquid for their needs. "A drawback to working with ionic liquids is the expense," said Mohan. While one gallon of gasoline can cost only three dollars, one gallon of an ionic liquid can cost around $20,000. "As more applications are discovered for ionic liquids, however, the cost will come down," he assured.

One benefit of working with ionic liquids is that they are reusable, said student Josh Lacey, a senior biology major is involved in research on ionic liquids with Mohan. "Traditionally organic solvents are harder to recover and recycle," said Lacey. "Ionic liquids are easier to recycle and recover, which is good because they are precious."

Lacey calls his research work thrilling. "With other reactions, you can see the same thing over and over. But this is something different, new and a challenge."

Mohan first became interested in ionic liquids because they have potential as environmentally friendly solvents. His research with ionic liquids has been funded by Research Corporation. A recent recipient of a National Science Foundation grant for his research with bismuth compounds, Mohan has been working with environmentally benign chemical practices known as "green chemistry," for eight years.

According to Mohan, it is uncommon to see work on something as groundbreaking as ionic liquids at a small university, such as Illinois Wesleyan. "Generally you see research like this at larger schools," said Mohan. "It's particularly exciting as we see it grow from academia to the industrial side."

For more information about the publication, or Mohan's work, contact Sherry Wallace in University Communications at (309) 556-3792.

Mohan, with Illinois Wesleyan since 1996, is a graduate of Hansraj College in Delhi, India. He holds a master's degree in organic chemistry from the University of Delhi and a Ph.D. in chemistry from the University of Maryland, Baltimore County. He conducted postdoctoral research at the University of Illinois at Urbana-Champaign. Mohan was the 2002 winner of the University of Maryland, Baltimore County, Distinguished Alumnus Award and a 2001 winner of the national Henry Dreyfus Teacher-Scholar Award.

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