

Synthesis and Applications of Catalysis in Ionic Liquids

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DESCRIPTION

The harmful and hazardous components of several solvents, particularly chlorinated hydrocarbons, raise serious environmental concerns such as air emissions and water effluent contamination. It is generally accepted that using non-conventional solvents as alternatives to environmentally unfavorable typical solvents can significantly reduce waste solvent production and hence the negative influence on the environment. Water, supercritical fluids, ionic liquids, solvent less procedures, and fluoruous techniques include the most common of these new solvent systems [1].

Ionic liquids have emerged as a promising alternative to all of the previously described nonconventional solvents of interest. An ionic liquid is a salt with a melting point lower than the boiling point of water. Ionic liquids are also called neoteric solvents, designer solvents, ionic fluids, and molten salts. Most of ionic liquids are made up of natural cations and inorganic anions. At room temperature, the cation should be unsymmetrical with various alkyl groups. The direction and hydrophilicity/hydrophobicity of ionic liquids can be regulated by using the right cation and anion combination [2].

Aside from the utilization of ionic liquids as alternative solvents, recent progress has been made in the design of functional ionic liquids, sometimes known as "task-specific ionic liquids." The terms task-specific ionic liquids or functionalized ionic liquids refer to an attempt to capitalize on ionic liquids' potential "design" capability and transform them into accurate working systems rather than just reaction medium [3].

Because of their distinct physical and chemical properties, ionic liquids were suggested as alternative green reaction media. When the reaction mixture is consistent, an extraction solvent that is immiscible with the ionic liquid that can be used to remove the product. The ionic liquid can act as an acidic, basic, or organo catalyst depending on the functional group connected to the cation and/or anion [4].

The utilization of acidic (Bronsted and Lewis) task-specific ionic liquids (TSILs) as catalytic material is becoming more common in the field of catalysis. TSILs have been produced to replace typical

mineral liquid acids, such as hydrochloric acid and sulphuric acid, in chemical reactions by combining the favorable advantages of solid acids and mineral acids. In terms of green chemistry, one of the most promising catalytic systems in chemistry is the replacement of toxic liquid acids with reusable TSILs.

For some surface procedures, basic functionalized ionic liquids have sparked unprecedented interest due to advantages such as easy recycling and greater catalytic efficiency than a mixture of inorganic base and ionic liquid. Ionic liquids are green solvents, however, they are made from components that utilize fossil fuels as a source. Ionic liquids will be more environmentally friendly if they are made from renewable raw sources. Sugars are a good and abundant raw material for the production of ionic liquids. Furthermore, the presence of hydroxyl groups in sugar-derived ionic liquids makes them strongly cooperative solvents, allowing them to be employed in stereoselective and metal-catalyzed processes [5].

CONCLUSION

They are currently being used as catalysts and catalytic supports in organic chemistry, rather than just as solvents. Their scope has expanded beyond academic research facilities and into industries, where practical applications have led to a variety of sustainable technology. The ability to vary characteristics by changing design allows a chemical to create an ionic liquid that meets its specific needs. To summarise, the topic of ionic liquid catalysis has immense potential that must be studied.

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