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Beyond the element: Ionic liquids as reaction media for clean biocatalyst synthesis of cinnamyl esters

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Topic: The elements and the Periodic Table for sustainable chemistry

Abstract:

The starting point in the search for new reaction media is the Periodic Table. The Periodic Table is very familiar to chemists and presents the elements arranged according to their atomic structure and chemical properties.The elements of the periodic table can be mixed, so there is an unlimited number of possible compounds that can be made.[1]

One of these compounds that arise through the combination of the elements of the Periodic Table, are the so called Ionic Liquids (ILs). ILs are ionic saltsthat emerged as a sustainable alternative to organic solvents due to their genuines properties (low vapor pressure, etc.). One of the astonished properties of ILs is that because of the selection of the cation and anion it can be formed a great amount of different ILs with different properties, demonstrating to be an excellent reaction media for biocatalysis. Furthermore, proteins are not soluble in most of the ILs when they are used as a reaction media. Therefore, the enzyme is also applied in immobilized form, coupled to a support for improving their operational stability and reutilization.[2]

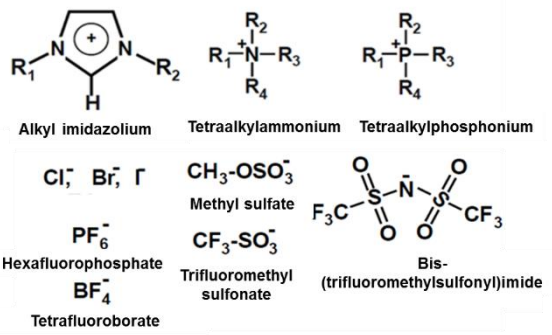

***Figure 1**. Examples of cations and anions which compose Ionic Liquids.*

In this work we present, as an example, the biocatalytic synthesis of cinnamyl acetate (compound responsible of cinnamon flavour) in hydrophobic ionic liquids based on alkyl cations with long side chains. These ILs are known for their ability to change from liquid to solid state with temperature. Thanks to this property, this type of ionic liquids has been called “Sponge-Like Ionic Liquids” (SLILs).[2]

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References

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