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UPCYCLING POLYCARBONATE WASTE: AN EFFICIENT ALTERNATIVE TO DISPOSAL

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Plastic waste is presently one of the most concerning issues, it is ubiquitous in the environment[1] and ecologically harmful. Precisely because of this, plastic recycling represents a possible way to overcome this issue. Furthermore, the recycling of plastic waste is an efficient alternative to waste disposal and it allows a closed loop-recycling which is the basis of the sustainable perspective.[2] In this framework, we investigated the recycling and the upcycling of polycarbonate (PC) under sonochemical conditions. The use of ultrasounds enables to carry out the reaction at room temperature. PC is used in DVDs, CDs toys, construction materials.[3] In particular, we studied the recycling of PC into bisphenol A (BPA) combining the use of task specific ionic liquids (TSILs) as catalysts, with ultrasounds. Furthermore, we also carried out the upcycling of polycarbonate to obtain ionic liquids (ILs). We performed the aminolysis of polycarbonate using N,N-dimethylethylenediamine and N,N-dimethylpropane-1,3-diamine as nucleophiles under ultrasound irradiation and, subsequently, we alkylated the ureas obtained with different alkyl halides in order to obtain ionic liquids.
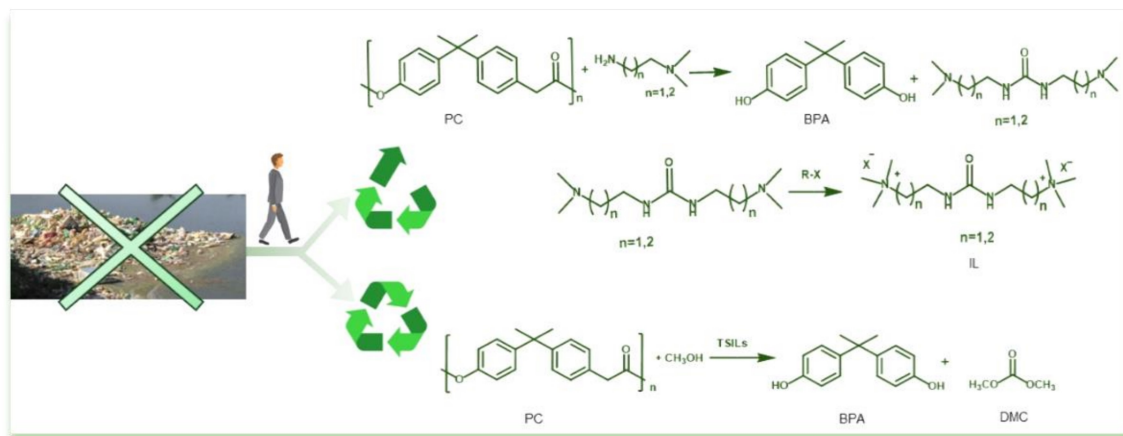

Figure 1. General reaction scheme

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[2] J. Payne, P. McKeown, M. D. Jones, *Polymer Degradation and Stability*, **(2019)** , *165*, 170-181.
[3] R. Singh, S. Shahi, Geetanjali, *ChemistrySelect* **(2018)**, *3*, 11957– 11962.