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Sustainable recovery of noble metals from electronic wastes (e-waste) using new ionic liquids

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2020
https://hdl.handle.net/10539/31301

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ABSTRACT

Only a minute amount e-waste is being officially recycled of the vast amounts being generated globally. A selective process using ionic liquids was investigated in this research because they have the potential of reducing the gaseous and aqueous emissions with solvent recovery. The objectives of this project was to experimentally determine the best conditions for the selective leaching of the noble metals from e-waste through the use the imidazolium based ionic liquids from e-waste however poor recoveries of gold, silver and palladium of 1%, 0.4% and 1% in the $BmimHSO_4$ respectively showed the ionic liquids were not very selective for the noble metals. Copper leaching in the ionic liquids did give higher recoveries of over 46% in the chloride based ionic liquid BmimCl whilst the other base metals also gave high recoveries to as high 98% for iron. Different factors like sample sizes, pre-treatment of the waste sample and lixiviant concentration were also considered with the aim increasing the leaching ability of the system It was determined that the leaching of the waste was highly dependent on the pH and oxidation potential of the system and that the presence of base metals hindered the leaching ability of the system. The acid pre-treatment of the sample did give high gold recoveries in the $BmimHSO_4$ ionic liquid at 65%. The overall leaching process did not produce high recoveries of the noble metals or display selectivity for noble metals of the ionic liquids without some pre-treatment process done.