

METAL-ORGANIC FRAMEWORKS (MOF) SYNTHESISED FROM MONOMERS DERIVED FROM POST-CONSUMER POLY(ETHYLENE TEREPHTHALATE) BOTTLES

M.G.S.A.M.E.W.D.D.K. Egodawele and W.S.S. Gunathilake*

Department of Chemistry, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka
**subhashinig@pdn.ac.lk*

Metal-Organic Frameworks (MOFs) are organic-inorganic hybrid crystalline porous materials with a high surface area consisting of a regular array of positively charged metal ions connected by organic linker molecules. This study describes the synthesis of an aluminium-based MOF using bis-(2-hydroxyethyl terephthalate) (BHET), which has not been reported as a linker material to synthesise MOFs before. BHET was obtained by glycolysis of post-consumer polyethylene terephthalate (PET) bottles by reacting with ethylene glycol, followed by recrystallisation. The glycolysed product of PET bottles, BHET, was characterised using melting point, Fourier Transform Infra-red Spectroscopy (FTIR) and Powder X-ray Diffraction (PXRD) techniques. The synthesis of MOF was carried out by solvothermal method using different aluminium salts and BHET. The synthesised MOF was characterised using FTIR and PXRD techniques. The results of FTIR and PXRD analyses confirmed the formation of BHET as the glycolysed product of PET bottles, and synthesised MOF has a similar structure with MIL-53(Al) MOF. Further, it was found that the reaction between the linker BHET and the salt, Al (OH)₃, results in the formation of the MIL-53(Al) MOF out of the tested aluminium salts. These results indicate that BHET obtained by recycling the post-consumer PET bottles by glycolysis can be used as a linker material to synthesise the MIL-(53) Al MOF.

Keywords: BHET, Glycolysis, MIL-53(Al), MOF, Poly(ethylene terephthalate)