

Process Optimization of Mechanochemical Synthesis for the Production of 4,4 Bipyridine Based MOFS using Twin Screw Extrusion and Multivariate Analysis

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Abstract : In this study, towards a green approach, we have investigated the effect of operating conditions of solvent assessed twin-screw extruder (TSE) for the production of 4, 4-bipyridine (1-dimensional coordinated polymer (1D)) based coordinated polymer using cobalt nitrate as a metal precursor with molar ratio 1:1. Different operating parameters such as solvent percentage, screw speed and feeding rate are considered. The resultant product is characterized using offline characterization methods, namely Powder X-ray diffraction (PXRD), Raman spectroscopy and scanning electron microscope (SEM) in order to investigate the product purity and surface morphology. A lower feeding rate increased the product's quality as more resident time was provided for the reaction to take place. The most important influencing factor was the amount of liquid added. The addition of water helped in facilitating the reaction inside the TSE by increasing the surface area of the reaction for particles

Keywords : MOFS, multivariate analysis, process optimization, chemometric

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