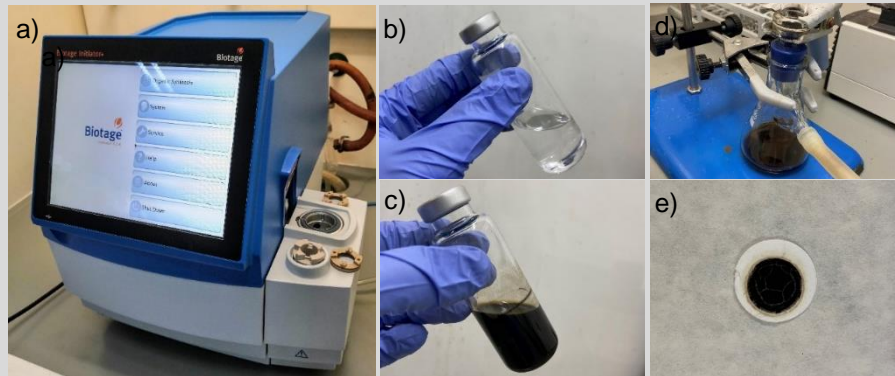


Tuning the Morphology in the Nanoscale of NH_4CN Polymers Synthesized by Microwave Radiation: A Comparative Study



A systematic study is presented to explore the NH_4CN polymerization induced by microwave (MW) radiation, keeping in mind the recent growing interest in these polymers in material science. Thus, a first approach through two series, varying the reaction times and the temperatures between 130 and 205 °C, was conducted. As a relevant outcome, using particular reaction conditions, polymer conversions similar to those obtained by means of conventional thermal methods were achieved, with the advantage of a very significant reduction of the reaction times. The structural properties of the end products were evaluated using compositional data, spectroscopic measurements, simultaneous thermal analysis (STA), X-ray diffraction (XRD), and scanning electron microscopy (SEM). As a result, based on the principal component analysis (PCA) from the main experimental results collected, practically only the crystallographic features and the morphologies in the nanoscale were affected by the MW-driven polymerization conditions with respect to those obtained by classical syntheses. Therefore, MW radiation allows us to tune the morphology, size and shape of the particles from the bidimensional C=N networks which are characteristic of the NH_4CN polymers by an easy, fast, low-cost and green-solvent production. These new insights make these macromolecular systems attractive for exploration in current soft-matter science.

