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Development and characterization of electrospun curcumin-loaded antimicrobial nanofibrous membranes

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Due to an increased need to treat wastewater from domestic and industrial sources to conform to Urban Waste Water Directive (91/271/EEC), wastewater treatment plants are faced with the deposition of Struvite causing pipe blockages and reduction in the rate of discharge flow thereby affecting cost and operation. The struvite is formed when the concentration of NH4+, Mg2+, and HPO43 ions reaches Supersaturation; however, its formation is controlled by pH, mixing energy, temperature and the presence of foreign ions in the solution. And when struvite was used as a fertilizer it displays good agricultural properties. Conventional methods for Struvite Removal like the use of highly corrosive chemicals and other mechanical methods may cause change in the quality of output water, pipe damages and lengthy time and cost of operation. Following a review of current and previous literature, analysis was carried out to encourage the formation of a synthetic struvite and break it off using pressure waves from an ultrasonic system while at the same time finding out most appropriate pH for the formation of struvite and analyse the solubility of struvite and one of its derivatives. Results indicated that pressure waves can break off struvite coated on glass, plastic and metallic pipes within 2, 3 and 15 minutes respectively. While struvite is best formed at pH level of 9, Newberyite is less soluble than struvite due to loss of crystalline water and ammonia holding the Newberyite crystals. Lastly, Struvite was found to provide a good source of phosphorus, Nitrogen and Magnesium for plant growth. Recycling and management of waste like Struvite is a means to sustainable development.

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