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Mechanical properties as printability predictors of Paroxetine-loaded filaments by fused deposition modeling

Three-dimensional printing (3DP) has been recently identified as an opportunity to make a significant technological leap over traditional pharmaceutical manufacturing processes, namely regarding customization of medicines. Fused deposition modelling (FDM), the most commonly used 3DP technique, involves the production of a drug-loaded filament, obtained previously by hot-melt extrusion (HME), which is then melted and continuously deposited on a surface, layer by layer, building the 3D-printed dosage form [1].

The successful integration of HME and FDM requires that both extrudability of the raw materials and printability of the HME filaments fabricated are attained, properties which are influenced by the mechanical, rheological and thermal properties of materials [2]. Since the filament is pulled by the printer feeding gears towards the heated nozzle where it softens to allow the accurate deposition on the building plate, evaluation of their mechanical properties is of the utmost importance. These properties are influenced not only by the polymeric formulation composition and the processing parameters used, but also by the storage conditions of the filaments [3-4].

This work aims to evaluate the impact of the environmental conditions on the quality and printability of paroxetine-loaded polymeric formulations for integrated HME-FDM, by assessing the mechanical properties of the filaments.

References:

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