

UTILISATION OF BIOCOMPATIBLE MIL-101(Fe) FOR THE DELIVERY OF FERULIC ACID

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Drug delivery systems are engineered technologies that have been designed to transport pharmaceutical compounds into their intended sites of action in the body, optimising the therapeutic effects. Sustained drug delivery is important to maintain constant drug levels in blood and tissue for extended periods of time improving patient compliance and efficacy. This research investigated the development of a biocompatible iron(III) based metal organic framework: MIL-101 for the controlled release of ferulic acid, a naturally occurring phenolic compound with antimicrobial, anti-inflammatory, antioxidant and anticancer properties. However, the treatment is limited due to its low water solubility and bioavailability. Thus, this study aimed to obtain sustained delivery of ferulic acid by incorporation into a biocompatible metal organic framework (MOF). The synthesised MOF: MIL-101(Fe) containing terephthalic acid as the organic linker and iron(III) as the inorganic node, was characterised by powder X-ray diffraction, Fourier transform infrared spectroscopy and scanning electron microscopy techniques. In this study, drug loading was carried out in 2.6×10^{-3} mol L⁻¹ solution of ferulic acid in a 50:50 (v/v) mixture of distilled water:ethanol. Drug loading data suggest that the maximum loading capacity of MIL-101(Fe) be obtained at 6 h as 44.63%. The release of ferulic acid from the drug loaded MIL-101 was carried out using dialysis bags dipped in phosphate buffer saline media at a pH of 7.4 to simulate *in-vitro* conditions for a period of 24 h and UV-visible absorbance spectra were obtained by withdrawing samples at predetermined time intervals. The spectra thus obtained show an increase in absorbance with time at 309 nm due to ferulic acid indicating that slow release of the drug was achieved with a percentage of 72.60% after 24 h. Further studies can be carried out to determine the release profiles of ferulic acid from MIL-101(Fe) using advanced techniques such as high-performance liquid chromatography.

Keywords: Drug delivery, Ferulic acid, MIL-101(Fe), Sustained release