

Curcumin and Methotrexate Loaded Montmorillonite Clay for Sustained Oral Drug Delivery Application

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Abstract : Natural montmorillonite clay is a common ingredient in pharmaceutical products, both as excipients and active support; hence considered as suitable candidate for Drug Delivery System. In this work, cationic detergent CTAB is used to increase the interlayer spacing of Na⁺-Montmorillonite clay to intercalate curcumin and methotrexate. Methotrexate is a folic acid antagonist, anti-proliferative and immunosuppressive agent; while curcumin is a bioactive constituent of rhizomes of *Curcuma longa*, possessing remarkable chemo-preventive and anti-inflammatory properties. The resultant inorganic-organic hybrids are characterized by X-ray diffraction (XRD), Infrared spectroscopy (FTIR) and Thermo Gravimetric Analysis (TGA) to confirm successful intercalation of curcumin and Methotrexate within clay layers. Pharmaceutical investigation of the hybrids is explored by studying the drug loading (%), encapsulation efficiency and release kinetics. Finally in-vitro studies are performed using cancer cells to find the effect of released curcumin to improve the sensitivity of clay bound methotrexate to ameliorate cell death compared to their effectiveness when used without the inorganic aluminosilicate vehicle.

Keywords : montmorillonite, methotrexate, curcumin, loading efficiency, release kinetics, anticancer activity

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