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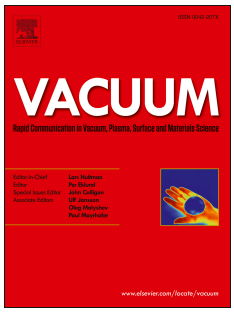

Gamma irradiative fabrication of semi interpenetrating network film: Optimization, characterization and investigation as colon, intestine specific drug release device

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Gamma irradiative fabrication of semi interpenetrating network film: optimization, characterization and investigation as colon, intestine specific drug release device.

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Abstract

Presented work was fabrication of colon and intestine specific drugs release device using gamma radiations as initiators. Semi-interpenetrating network (Semi-IPN) film was castoff as drug delivery device to investigate release profile of diethyl carbamazine citrate and amoxicillin in 9.2, 7.0 and 2.2 pH media. Optimized reaction parameters for semi-IPN film were: gamma dose 2.5 KGy/hr; solvent 25 ml; AA 4.6 mol/L; MBA 5.1×10^{-3} mol/L and pH 9.0. Sample was characterized by X-RD; SEM; FT-IR and TGA studies. Semi-IPN film was thermally more stable than backbone showing 6400% water uptake efficacy. Sample degraded upto 80.3% and 81.7% at a degradation rate of 1.147(mg/min) and 1.167(mg/min) in vermi-composting and bio-composting degradations, respectively. Release behavior of *diethyl carbamazine citrate* was found to be non-Fickian in 9.2, 7.0 pH and Fickian in 2.2 pH solutions. In *amoxicillin* case II diffusion was found in 9.2 pH, non-Fickian in 7.0 and 2.2 pH solutions. Both drugs showed their maximum release in 9.2 pH media with higher values of $\mathbf{D_i}$ than $\mathbf{D_L}$, thus can be used as colon and intestine specific release device where, drug released rate should be fast in the beginning followed by sustain release.

Keywords: gamma radiations; semi-IPN film; pH responsive; biodegradable; drug delivery.

1. Introduction

Past few decades has witnessed increased demand of natural based semi-IPNs and IPNs in diagnostics [1], tissue engineering [2], cellular immobilization [3] drug delivery [4] and purification [5-8].

Various biopolymers for making drug delivery devices are: agar, chitosan, chitin, cellulose, hemicellulose, starch, collagen, pectin, β-carrageenan and gelatin [9]. Commonly used gums for drug release are: xanthan gum, guar gum, gum ghatti, gum tragacanth, acacia gum, locust bean gum, khaya gum, sterculia gum and tara gum [10]. The major challenges related to these materials are: their low tensile strength for load bearing applications, difficulty in drug