

**KINETIC RELEASE OF TRAMADOL HYDROCHLORIDE FROM HYDROPHILIC SWELLABLE MATRICES CONTAINING TWO DIFFERENT DIRECTLY COMPRESSIBLE FILLERS**

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**ABSTRACT**

The effects of mass fractions (mf) and types of polymer on the release kinetics of tramadol HCl (TMH) from hydrophilic swellable matrices were studied. Each formulation of the 500 mg tablet contains 200 mg TMH at a fixed mf of 0.40, polymer, i.e., hydroxypropylmethylcellulose (HPMC) K4M, K15M, xanthan gum (XG) or guar gum (GG) at an mf of 0.15, 0.30, 0.45 and 0.60, respectively, and dibasic calcium phosphate dihydrate (DCPD) or spray dried lactose (SDL) as a direct compression filler. Percentage drug release ( $Q_i$ ) was carried out in an USP dissolution apparatus type II in distilled water at various times (t) from 0 – 24 h.  $Q_i$  of all formulations and the square root of time was shown to have a good linear relationship with a high regression constant that indicated that the drug release from the matrix tablets followed the Higuchi model of diffusion. The results showed that the type and mf of polymer and also the type of filler that could affect the rate constant ( $k$ ), natural convection ( $Q_0$ ) and the lag time of TMH from matrix tablets. For various polymers used, XG provided the best retardability for drug release at all mf. For different fillers used, insoluble DCPD showed better retardability than SDL. The kinetics of TMH release from matrix tablets, using insoluble DCPD, was described by Shah et al model of diffusion, whereas those from matrices using soluble SDL was described by Jateleela et al model. From the calculation, using proposed equations in both models, most of the observed release profiles were closely fitted the predicted release profiles. Furthermore, the mechanisms of TMH transport from matrix tablets were described by the transport equation of Korsmeyer and Peppas. Matrices using GG provided quasi-Fickian diffusion, whereas most matrices using HPMC K4M or K15M provided non-Fickian transport, except matrices containing 0.15 either HPMC provided quasi-Fickian diffusion. For matrices using XG, the mf of XG, which changed the quasi-Fickian diffusion to non-Fickian transport was 0.60 XG for matrices containing DCPD and 0.45 XG for those containing SDL, respectively.

**KEY WORDS:** HYDROPHILIC SWELLABLE MATRIX/ TRAMADOL HYDROCHLORIDE/  
HPMC K4M/ HPMC K15M/ XANTHAN GUM

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