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Poly(2-hydroxyethyl methacrylate)-Based Hydrogels for Slow Release of Pralidoxime Chloride

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The corresponding author in the footnote had been changed in error. The name should have been S. Agarwal but had been printed as D. C. Gupta. The corrected title page follows.

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ABSTRACT: Pralidoxime chloride (PAM-Cl)-loaded poly(2-hydroxyethyl methacrylate) (PHEMA)-based hydrogels were prepared by bulk copolymerization of 2-hydroxyethyl methacrylate (HEMA) with different mol fractions (0.02–0.10) of trimethylsilyl methacrylate. Characterization of the gels was done by dynamic swelling measurements. It was found that copolymerization does not alter the swelling mechanism of PHEMA and it essentially remains Fickian in nature. *In vitro* drug-release studies show the increase in release time from 6 to 12 h on incorporation of a 0.1 mol fraction of trimethylsilyl methacrylate on the PHEMA backbone. © 1997 John Wiley & Sons, Inc. J Appl Polym Sci **66:** 267–270, 1997

Key words: hydrogels; poly(2-hydroxyethyl methacrylate); pralidoxime chloride; swelling

INTRODUCTION

Organophosphorus (OP) compounds are generally used as insecticides. There is also the threat that some of the highly toxic OP compounds may be used as chemical warfare agents. These OP compounds irreversibly inhibit an enzyme known as acetylcholine esterase (AChE), leading to the accumulation of acetylcholine in the nervous synapse. Accumulation of AChE induces several toxic symptoms and death may also result. 2-Pralidoxime chloride (PAM-Cl) is used as the reactivator of the inhibited AChE.[1,2] PAM-Cl in conjunction with atropine has generally been adopted for the treatment of poisoning by organophosphorus esters, i.e., nerve agent poisoning. The PAM-Cl antidote must be administered in limited but multiple doses over a period of not more than 48 h. Multiple doses can be replaced by its slow-release formulations using a polymeric matrix system loaded with PAM-Cl.

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Poly(2-hydroxyethyl methacrylate) (PHEMA)-based hydrogels are increasingly being used as a swellable matrix system for the release of different classes of bioactive agents because of their biocompatibility characteristics.[3–6] The permeability of hydrogels can be tailored over a wide range to release a bioactive agent at a desired rate. Copolymerization of 2-hydroxyethyl methacrylate (HEMA) with other comonomers including crosslinkers is done for the tailor-making of PHEMA.[7–9] Therefore, in the present studies, an attempt was made to explore the possibility of using PHEMA and its copolymeric hydrogels with trimethylsilyl methacrylate for the slow release of PAM-Cl. Trimethylsilyl methacrylate was chosen as a comonomer to introduce some amount of hydrophobicity in an otherwise hydrophilic PHEMA system.

EXPERIMENTAL

Materials

2-Hydroxyethyl methacrylate (HEMA, Aldrich) was purified by vacuum-distillation. Ethylene gly-