Journal of Physical Science, Vol. 27(3), 159–168, 2016

Fabrication of Cellulose Aerogel from Sugarcane Bagasse as Drug Delivery Carriers

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Published online: 25 November 2016

To cite this article: Chin, S. F. et al. (2016). Fabrication of cellulose aerogel from sugarcane bagasse as drug delivery carriers. *J. Phys. Sci.*, 27(3), 159–168, http://dx.doi.org/10.21315/jps2016.27.3.10

To link to this article: http://dx.doi.org/10.21315/jps2016.27.3.10

ABSTRACT: *Currently most of the aerogel-based drug delivery carriers are made from non-biodegradable materials, such as silica. In this study, highly porous cellulose aerogels with Brunauer-Emmett-Teller (BET) surface areas that varied between 22 $m^2 g^{-1}$ and 525 $m^2 g^{-1}$ were prepared from a sugarcane bagasse cellulose solution of various concentrations. The potential utility of cellulose aerogels as controlled release carriers was evaluated by loading methylene blue (MB) as a model hydrophilic drug. The MB loading capacity and release kinetic profiles of cellulose aerogels were observed to be substantially influenced by their BET surface areas. Under optimum conditions, a maximum loading capacity of 6.4 mg MB mg^{-1} cellulose aerogel was achieved with sustained release of MB from cellulose aerogels at physiological pH over a period of 23 h.*

Keywords: Cellulose, aerogels, controlled release, drug carriers, sugarcane bagasse

1. INTRODUCTION

In recent years, drug delivery carriers have attracted much attention in the healthcare and pharmaceutical industries because they offer the potential to improve therapeutic efficacy, minimise non-specific side effects, prevent drug degradation and enhance the water solubility of drug molecules.[1] Various types of drug delivery systems, such as nanoparticles,[2] polymeric micelles,[3] carbon nanotubes[4] and nanocapsules[5] have been extensively studied to achieve optimum drug release kinetics. Aerogels have emerged as promising drug delivery carriers