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Preparation and Characterization of Carboxymethyl Sago Starch Hydrogel

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Abstract. Hydrogel is a three-dimensional network of polymer chains that receives high attention in scientific research due to their potential in drug delivery, biomedical field and waste water treatment. In this study, carboxymethyl sago starch (CMS) hydrogel was prepared via crosslinking technique where CMS was dissolved in HCl solution under vigorous stirring to form gel. The effect of the percentage amount of CMS, concentration of the acid solution, reaction time and reaction temperature were the parameters that have been studied to identify the optimum condition of CMS hydrogel. It was found that 60% amount of CMS in 2.0M acid solution for 12 hours at room temperature were the optimum conditions for CMS hydrogel. The CMS hydrogel was characterized by using Fourier Transform Infrared (FT-IR), thermogravimetric analysis (TGA) and scanning electron microscopy (SEM). FTIR spectrum of CMS hydrogel shows an additional sharp absorption peak at 1723 cm^{-1} denote that the Na in CMSS being exchanged to H from hydrochloric acid solution. SEM image of CMS hydrogel shows a spongy surface with empty space called pores in structure and connected to each other to form networks. TGA curve shows that the maximum rate of thermal decomposition of CMS hydrogel is higher than CMS at $311.89\text{ }^{\circ}\text{C}$ with 60.22 % major weight loss. This could be due to the presence of the cross-linkages in the CMS hydrogel.

Keywords: carboxymethyl, starch, hydrogel