

## Preparation, optimization and swelling study of carboxymethyl sago starch (CMSS) - acid hydrogel

### ABSTRACT

In this study, sago starch was modified in order to enhance its physicochemical properties. Carboxymethylation was used to introduce a carboxymethyl group into a starch compound. The carboxymethyl sago starch (CMSS) was used to prepare smart hydrogel by adding acetic acid into the CMSS powder as the crosslinking agent. The degree of substitution of the CMSS obtained was 0.6410. The optimization was based on the gel content and degree of swelling of the hydrogel. In this research, four parameters were studied in order to optimize the formation of CMSS–acid hydrogel. The parameters were; CMSS concentration, acetic acid concentration, reaction time and reaction temperature. From the data analyzed, 76.69% of optimum gel content was obtained with 33.77 g/g of degree of swelling. Other than that, the swelling properties of CMSS–acid hydrogel in different media such as salt solution, different pH of phosphate buffer saline solution as well as acidic and alkaline solution were also investigated. The results showed that the CMSS–acid hydrogel swelled in both alkaline and salt solution, while in acidic or low pH solution, it tended to shrink and deswell. The production of the hydrogel as a smart material offers a lot of auspicious benefits in the future especially related to swelling behaviour and properties of the hydrogel in different types of media.

**Keyword:** Carboxymethyl sago starch; Optimization; Hydrogel; Gel content; Swelling in different media