

## ABSTRACT

White bean jack can be used as a source of cellulose. To increase the application of cellulose, its derivatives can be formed such as hydroxypropyl methyl cellulose (HPMC). From the jack hull to the synthesis and characterization of HPMC.

Determination of the optimization was preceded by literature review to determine the range of experimental points with the dependent variables are molar substitution (MS) and the degree of substitution (DS). Experimental points were obtained with variations of NaOH concentration (5; 22.5; and 40%), dimethyl sulfate (DMS) variations (40; 80; and 120%) and variations in propylene oxide (PO) (80; 120; and 160%). Then optimization of HPM was carried out using a box-behind design (BBD) and then analyzed using response surface methodology (RSM). Furthermore, HPMC was characterized by molar substitution (MS), degree of substitution (DS), water holding capacity (WHC), oil holding capacity (OHC), lightness, yield, crystallinity and FT-IR spectra of the functional groups of HPMC.

The optimization of the HPMC synthesis from white jack bean cellulose based on RSM was achieved by the use of 23.11% NaOH solution, 43.4% DMS and 81.8% PO. The characteristics of the optimized HPMC were MS 0.13; DS 1.14; water content 9.04% (wb); WHC 2.20 g / g; OHC 2.09 g / g; lightness 90.93, yield 114.78 and crystallinity 64%. FT-IR spectra of HPMC from white jack bean hull cellulose read at wave number 2924  $\text{cm}^{-1}$ , 1373  $\text{cm}^{-1}$ , 1111  $\text{cm}^{-1}$ , 1391  $\text{cm}^{-1}$  and 848  $\text{cm}^{-1}$  which are characteristic of HPMC functional groups.

**Keywords: BBD; HPMC; RSM; White Jack Bean Hull**

## INTISARI

Kulit koro pedang putih dapat digunakan sebagai sumber selulosa. Salah satu alternatif untuk meningkatkan aplikasi selulosa adalah dengan memodifikasi selulosa menjadi produk turunan selulosa seperti *Hydroxypropyl Methyl Cellulose* (HPMC). Tujuan dari penelitian ini adalah melakukan optimasi terhadap sintesis dan karakteristik HPMC dari selulosa kulit koro pedang putih.

Proses optimasi didahului dengan kajian literatur untuk menentukan kisaran titik percobaan dengan variabel terikat berupa molar substitusi (MS) dan derajat substitusi (DS). Diperoleh titik percobaan dengan variasi konsentrasi NaOH (5, 22,5, dan 40 %), variasi dimetil sulfat (DMS) (40, 80, dan 120 %), dan variasi proilen oksida (PO) (80, 120, dan 160 %). Kemudian Optimasi sintesis HPMC dilakukan dengan menggunakan *Box-Behnken design* (BBD) lalu dianalisis menggunakan *Response Surface Methodology* (RSM) Berikutnya HPMC dikarakterisasi meliputi molar substitusi (MS), derajat substitusi (DS), *water holding capacity* (WHC), *oil holding capacity* (OHC), *lightness*, rendemen, kristalinitas dan spektra FT-IR untuk mengetahui gugus fungsi HPMC.

Hasil optimasi sintesis HPMC dari selulosa kulit koro pedang putih berdasarkan RSM diperoleh titik optimum pada konsentrasi NaOH 23,11%, DMS 43,4% dan PO 81,8%. dengan karakterisasi kadar air 9,04% (wb); MS 0,15; DS 1,18; WHC 2,20 g/g; OHC 2,09 g/g; *lightness* 90,93; rendemen 114,78% dan kristalinitas 64%. Spektra FT-IR HPMC koro pedang putih terbaca pada bilangan gelombang  $2924\text{ cm}^{-1}$  dan  $1373\text{ cm}^{-1}$ ,  $1111\text{ cm}^{-1}$ ,  $1391\text{ cm}^{-1}$  dan  $848,48\text{ cm}^{-1}$  yang merupakan ciri khas dari gugus fungsional HPMC.

**Kata Kunci : HPMC;BBD; Kulit Koro Pedang Putih; RSM**