

ABSTRAK

Telah dilakukan pengujian pengaruh pH, temperatur dan konsentrasi elektrolit pendukung terhadap *swelling behavior* hidrogel komposit berbasis Polivinil alkohol/ Akrilamid/ Grafit Oksida (PVA/AAm/GO). Penelitian ini bertujuan untuk mengkaji pengaruh kondisi lingkungan (pH, temperatur, dan konsentrasi elektrolit pendukung) terhadap *Swelling Behavior* Hidrogel Komposit berbasis PVA/AAm/GO. Hidrogel dipreparasi dengan metode *solution mixing* pada komposisi optimum perbandingan PVA:AAm:GO = 5:10:4. Karakterisasi hidrogel komposit dilakukan dengan spektroskopi FTIR, XRD, dan SEM. Kajian pengaruh kondisi lingkungan terhadap *swelling behavior* hidrogel komposit dilakukan pada variasi kondisi lingkungan pH (2, 7 dan 9), [NaCl] (%b/b) (1%, 4%, 10%, 25% dan 28%), serta temperatur (4°C, 26°C, dan 40°C). Hasil karakterisasi SEM dan XRD menunjukkan hidrogel komposit merupakan material berstruktur kristalin serta merupakan material berpori. Selain itu, spektra FTIR mengkonfirmasi interaksi antara PVA, AAm, dan GO dalam matrik hidrogel yang ditunjukkan dengan pergeseran dan perubahan intensitas pita serapan untuk gugus fungsi C-O/C-O-C, C-N, C=O, C-H sp³, dan -OH. *Swelling behavior* hidrogel pada kondisi awal memberikan hasil sebesar 179 %. *Swelling* pada pH 2; 7; 9 secara berturut turut sebesar 58 %; 149 % dan 302 %. *Swelling* pada temperatur 4°C; 26°C; 26°C (desikator); 40°C (oven); 40°C (inkubator) masing masing sebesar 64 %; 34 %, 145 %, 84 % dan 245 %. Hasil pengaruh variasi konsentrasi elektrolit 1%; 4%; 10%; 25%; dan 28% masing masing sebesar 30 %; 45 %; 51 %; 59 % dan 38 %. Proses *swelling* yang dilakukan pada kondisi pH=9, T=40°C, [NaCl]=25% adalah sebesar 560 %. Temuan ini menunjukkan hidrogel komposit PVA/AAm/Grafit Oksida memiliki sensitifitas pada pH, temperatur dan konsentrasi elektrolit pendukung.

Kata kunci : Hidrogel Komposit, PVA, AAm, GO, *Swelling Behavior*

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PENGARUH pH, TEMPERATUR DAN KONSENTRASI ELEKTROLIT PENDUKUNG TERHADAP SWELLING BEHAVIOR HIDROGEL KOMPOSIT BERBASIS PVA/AAm/GRAFIT OKSIDA

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ABSTRACT

The effect of pH, temperature and concentration of supporting electrolyte conditions on the swelling behavior of hydrogel-based on Polyvinyl alcohol/ Acrylamide/ Graphite Oxide (PVA/AAm/GO) has been done. The hydrogel was prepared by mixing solution method with optimal composition ratio of PVA: AAm: GO was 5: 10: 4. Characterization of hydrogel composite was carried out by means of several methods i.e. FTIR spectroscopy, X-ray Diffraction technique, and Scanning Electron Microscopy (SEM). In particular, the effect of environmental conditions on the swelling behavior of hydrogel composite was performed on the variation of environmental conditions at pH (2, 7 and 9), the concentration of NaCl (% w/w) (1%, 4%, 10%, 25% and 28%), as well as the temperature (4 ° C, 26 ° C and 40 ° C). The SEM image and X-ray diffraction patterns indicate that hydrogel composite was a porous material with crystalline structure. In addition, the FTIR spectra confirmed the interaction between PVA, AAm, and GO in hydrogel matrix which shown by the shifts and changes of intensity from an absorption band for spesific functional group i.e. C-O/C-O-C, C-N, C=O, C-H sp³, and OH. Hydrogel swelling behavior in the initial conditions reach up to 179%. Swelling at pH 2; 7; 9 each gave yield of 58%; 149% and 302%, repectively. The swelling ratio of hydrogel at temperatures of 4°C; 26°C; 26°C (desiccator); 40°C (oven); 40°C (incubator) was 64%; 34%, 145%, 84% and 245%, respectively. The results of the effect of variations of the NaCl's concentration at 1%; 4%; 10%; 25%; and 28% was of 30%; 45%; 51%; 59% and 38%, respectively. While the swelling capacity that is performed under conditions of pH=9, T=40 ° C, [NaCl]=25% reached up to 560%. This results inferred that hydrogel PVA/AAm/Graphite oxide had a sensitivity to pH, temperature and concentration of supporting electrolytes.

Keywords : Hydrogel composite, PVA, AAm, GO, and Swelling Behavior