

Laksanawadee Saikhao 2012: Hydrogel Preparation from Regenerated Cellulose and Silk Fibroin. Master of Science (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Mrs. Potjanart Suwanruji, Ph.D. 72 pages.

This study was on the preparation of the blended hydrogel from the regenerated cellulose obtained from rayon fiber residue, the industrial waste fiber, and *Bombyx mori* silk fibroin. The regenerated cellulose possessed cellulose II crystalline form while the β -sheet structure of silk fibroin was observed. The infrared spectra of the blends showed changes in shape and intensity of IR absorption frequency characteristics in the region of $3500\text{-}3300\text{ cm}^{-1}$ as compared with those of the starting materials, cellulose and pure silk fibroin. This indicates the occurrence of the intermolecular interactions between the -OH groups of cellulose and silk fibroin by forming hydrogen bond. The tensile properties of the blends with cellulose content lower than 50 % could not be measured due to the weakness of the prepared hydrogel. The stronger and more flexible hydrogel was obtained with increasing the regenerated cellulose content and the pure cellulose hydrogels had the swelling ratios higher than the blends. The 75 and 100% cellulose hydrogels with a crosslinking agent, NHDT, could absorb higher water molecules to their structures and exhibit a higher initial degradation temperature as compared with those without NHDT. The study on the effect of NaCl and CaCl_2 salt addition aiming to establish a porous structure to the blends showed that adding 2.5 and 5% CaCl_2 did not affect the structure of hydrogels while the 10% CaCl_2 did result in a rough and porous structure. In addition, hydrogels with added NaCl showed macroporous structure and the highest swelling ratios at about 150% while the pure cellulose hydrogels displayed the lowest swelling ratio around 40%.

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