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Evaluation of Thermosensitive Polymers As a Drug Delivery System*

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Drug delivery system (DDS) has been an important subject in pharmaceutical science research. Novel intelligent materials are required in DDS such as controlled release and absorption of drugs, especially products of biotechnology. Polymers are fruitful sources of the materials.

We prepared thermosensitive polymers, poly(N-isopropylacrylamide), which showed specific swelling change in response to temperature in aqueous solvents. The polymers showed swelling on cooling and gel shrinking in an elevated temperature. The volume changes were observed when the temperature was raised until a lower critical solution temperature (LCST) occurred.

Beads of the thermosensitive polymers were prepared and packed in a glass column. The column was thermostated and connected to reversed phase high-performance liquid chromatography (HPLC). The HPLC behaviors of samples were studied in a variety of column temperatures. The samples used as model drugs were antipyretics, albumin and related proteins. The changes of adsorption of the samples to the polymer in aqueous mobile phase with an external temperature were estimated by the behaviors.

Membranes of the polymers were prepared. A two chamber diffusion cells were separated with the membrane. The permeations of samples through the membrane were estimated in a variety of temperatures by the concentration of the sample of each cells. The concentrations were determined by HPLC.

The results showed that the thermosensitive polymers are promising materials for DDS such as temperature-controlled drug release.

* 本報告は Proceedings of the First International Conference on Intelligent Materials, eds. by T. Takagi, K. Takahashi, M. Aizawa and S. Miyata, Technomic Pub., PA, U.S.A., 1992, p. 415—418 に発表

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