

## REFERENCES

- Bodmeier, R., Oh, K. H., and Prammar, Y. (1989). Preparation and evaluation of drug-containing chitosan beads. Drug Development and Industrial Pharmacy, 15(9), 1475-1494.
- Chemistry, Biochemistry, Physical Properties and Applications
- Chirachanchai, S., and Chunharotrit, S. *Journal of Bioact. and Compat.*
- Cushing, I.B., R. V. Davis, E. I. Kratovil, D. W. McCorquodale (1954). J. Am. Chem. Soc., 76, 459.
- Fones, W.S. (1949). The use of sodium hydride in the alkylation of N-substituted amides. Journal of Organic Chemistry, 14, 1099-1102.
- Fujii, S., H. Kumagai, M. Noda (1980). Carbohydrate Research, 83,389.
- Hirano, S. (1978). A facile method for the preparation of novel membranes from N-actyl-and N-acrylidene-chitosan gels. Agricultural and Biological Chemistry, 42(10), 1939-1940.
- Hirano,S., Ohe, Y., and Ono, H. (1976). Selective N-acylation of chitosan. Carbohydrate Research, 47, 315-320.
- Horton, D., and D.R. Lineback (Eds.). (1965). Methods in Carbohydrate Chemistry. New York: Academic Press. 5, 403.
- Jameela, S. R., Misra, A., and Jayakrishnan, A. (1994). Cross-linked chitosan microspheres as carriers for prolonged delivery of macromolecular drugs. J. Biomater. Sci. Polymer Edn, 6(7), 621-632.
- Kanke, M., Katayama, H., Tsuzuki, S., and Kuramoto, H. (1989). Application of chitin and chitosan to pharmaceutical preparations. I. film preparation and in vitro evaluation. Chem. Pharm. Bull., 37(2), 523-525.

- Kurita, K., Koyama, Y., and Chikaoka, S. (1988). Studies on chitin XVI. Influence of controlled side chain introduction to chitosan on the adsorption of copper(II) ion. Polymer Journal, 20(12), 1083-1089.
- Kurita, K., S. Chikaoka, M. Kamiya, Y. Koyama (1988) Bull. Chem. Soc. Jpn., 61, 927.
- Kurita, K., S., Chikaka, Y. Koyama (1988) Chem. Lett., 9.
- Kurita, K., Yoshino, H., Yokota, K., Ando, M., Inoue, S., Ishii, S., and Nishimura, S. I. (1992). Preparation of tosylchitins as precursors for facile chemical modification of chitin. Macromolecules, 25, 3786-3790.
- Lin, S. Y., and Perng, R. I. (1992). Adsorption and desorption of indomethacin on cellulose-like biopolymers: chitin and chitosan. Chem. Pharm. Bull., 40(4), 1058-1060.  
London: Elsevier Applied Science, p. 431.
- Miyazaki, S., Ishii, K., and Nadai, T. (1981). The use of chitin and chitosan as drug carriers. Chem. Pharm. Bull., 29(10), 3067-3069.
- Miyazaki, S., Nakayama, A., Oda, M., Takada, M., and Attwood, D. (1994). Chitosan and sodium alginate based bioadhesive tablets for intraoral drug delivery. Biol. Pharm. Bull., 17(5), 745-747.
- Nagasawa, K., Y. Tohira, Y. Inoue, N. Tonoura (1971). Carbohydrate Research, 18, 95.
- Nikolaev, A. F., E. S. Shulgina, V. M. Chudnova Zh. Priko. Khim., (1985) 58, 1916; Chem Abstr., 104, 186764 w.
- Nishimura, S. I., Kohgo, O., and Kurita, K. (1991). Chemospecific manipulation of a rigid polysaccharide: Syntheses of novel chitosan derivatives with excellent solubility in common organic solvents by regioselective chemical modifications. Macromolecules, 24, 4745-4748.
- Nud'ga, L. A., E. A. Plisko, S. N. Danilov (1973) Zhur. Obsch. Khim., 43, 2756 ; Chem. Abstr., 80 : 96251h.

- Ohya, Y., Nonomura, K., and Ouchi, T. (1995). In vivo and in vitro antitumor activity of CM-chitin immobilized doxorubicins by lysosomal digestible tetrapeptide spacer groups. Journal of Bioactive and Compatible Polymers, 10, 223-234.
- Onishi, H., Machida, Y., and Nagai, T. (1994). Synthesis and properties of the monoesters of 5-fluorouridine with 4-carboxybutyric acid and their conjugates with chitosan. Chem. Pharm. Bull., 43(2), 340-343.  
*Polym.*, submitted.
- S. Tokura, N. Nishi, and J. Noguchi, (1979). "Studies on Chitin III: Preparation of Chitin Fibers, Polym. Journal, 11(10), 781-786 .
- Sawayanagi, Y., Numbu, N., and Nagai, T. (1982). Directly compressed tablets containing chitin or chitosan in addition to mannitol. Chem. Pharm. Bull., 30(11), 4216-4218.
- Sawayanagi, Y., Numbu, N., and Nagai, T. (1982). Use of chitosan for sustained- release preparations of water-soluble drug. Chem. Pharm. Bull., 30(11), 4213-4215.
- Seo, T., Ohtake, H., Unishi, T., and Iijima, T. (1995). Permeation of solutes through chemically modified chitosan membranes. Journal of Applied Polymer Science, 58, 633-644.
- Shimizu, Y., Kono, K., Kim, I.S., and Takagishi, T. (1995). Effects of added metal ions on the interaction of chitin and partially deacetylated chitin with an azo dye carrying hydroxyl groups. Journal of Applied Polymer Science, 55, 255-261.
- Simionescu, Cr., I., Popa, M., I., and Dumitriu, S. (1985). Bioactive polymers XXI. Coupling of chloramphenicol on Biozan R. Colloid & Polymer Science, 263, 620-623.
- Struszczyk, H., Pospieszny, H., and Kotlinski, S. (1989), Some New Applications of Chitosan in Agriculture, in Chitin and Chitosan. London, Elsevier, Appl. Sci.

- Tachaboonyakiat, W. in preparation.
- Takai, M.; Shimizu, Y.; and Hayashi, J. in Chitin and Chitosan Sources.
- Tanoo, B. C., Sunny, M. C., and Jayakrishnan, A. (1992). Cross-linked chitosan microspheres: preparation and evaluation as a matrix for the controlled release of pharmaceuticals. J. Pharm. Pharmacol., 44, 283-286.
- Teixeira, M. A., Paterson, W. J., Dunn, E. J., Li, Q., Hunter, B. K., Goosen, M. F. A. (1990). Assessment of chitosan gels for the controlled release of agrochemicals. Ind. Eng. Chem. Res., 29, 1205-1209.
- Wade, L. G. (1991). Organic Chemistry USA: Prentice Hall.
- Wang, X. P., Shen, Z. Q., Zhang, F. Y. (1998). Pervaporation separation of water/alcohol mixtures through hydroxypropylated chitosan membranes. Journal of Applied Polymer Science, 69, 2035-2041.
- Watanabe, K., Saiki, I., Uraki, Y., Tokura, S., and Azuma, I. (1990). 6-O-Carboxymethyl-chitin (CM-chitin) as a drug carrier. Chem. Pharm. Bull., 38(2), 506-509.
- Worthing, C. R. (1979). The Pesticide manual A world compendium. England: The British Crop Protection Council. 6, 79.
- Xu, J., McCarthy, S. P., and Gross, R. A. (1996). Chitosan film acylation and effects on biodegradability. Macromolecules, 29, 3436-3440.
- Yao, K. D., Peng, T., Feng, H. B., and He, Y. Y. (1994). Swelling kinetics and release characteristic of crosslinked chitosan: polyether polymer network (semi-IPN) hydrogels. Journal of Polymer Science: Part A: Polymer Chemistry, 32, 1213-1223.
- Yao, K. D., Yin, Y. J., Xu, M. X. and Wang, Y.F. (1995). Investigation of pH-sensitive drug delivery system of chitosan/gelatin hybrid polymer network. Polymer International, 38, 77-82.

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