

## REFERENCES

- [1]. Khanafari, A., R. Marandi, and S. Sanatei. (2008). "Recovery of chitin and chitosan from shrimp waste by chemical and microbial methods " **Iranian Journal of Environmental Health, Science and Engineering** 5(1): 19-24.
- [2]. Dutta, P.K., M. N. V. Ravikumar, and J. Dutta. (2002). "Chitin and chitosan for versatile applications." **Journal of Macromolecular Science, Part C: Polymer Reviews**, 42(3): 307-354.
- [3]. Roberts, G. (1992). "Solubility and solution behaviour of chitin and chitosan." In **Chitin Chemistry**. London: Macmillan Press: 72-73.
- [4]. Aranaz, I., et al. (2009). "Functional characterization of chitin and chitosan." **Current Chemical Biology** 3: 203-230.
- [5]. Sinha, V.R., et al. (2004). "Chitosan microspheres as a potential carrier for drugs." **International Journal of Pharmaceutics** 274: 1-33.
- [6]. Hejazi, R. and M. Amiji. (2003). "Chitosan-based gastrointestinal delivery systems." **Journal of Controlled Release** 89(2): 151-165.
- [7]. Pedro, A.S., et al. (2009). "Chitosan: An option for development of essential oil delivery systems for oral cavity care?" **Carbohydrate Polymers** 76(4): 501-508.
- [8]. Rekha, M.R. and C.P. Sharma. (2009). "Synthesis and evaluation of lauryl succinyl chitosan particles towards oral insulin delivery and absorption." **Journal of Controlled Release** 135(2): 144-151.
- [9]. Opanasopit, P., et al. (2009). "Methylated N-(4-N,N-dimethylaminobenzyl) chitosan as effective gene carriers: Effect of degree of substitution." **Carbohydrate Polymers** 75(1): 143-149.
- [10]. Nunthanid, J., et al. (2008). "Development of time-, pH-, and enzyme-controlled colonic drug delivery using spray-dried chitosan acetate and hydroxypropyl methylcellulose." **European Journal of Pharmaceutics and Biopharmaceutics** 68(2): 253-259.

- [11]. Puttipipatkachorn, S., et al. (2001). "Drug physical state and drug-polymer interaction on drug release from chitosan matrix films." **Journal of Controlled Release** 75: 143-153.
- [12]. Cravotto, G., et al. (2005). "Chemical modification of chitosan under high-intensity ultrasound." **Ultrasonics Sonochemistry** 12: 95-98.
- [13]. Prashanth, K.V.H. and R.N. Tharanathan. (2007). "Chitin/chitosan: modifications and their unlimited application potential—an overview." **Trends in Food Science & Technology** 18: 117-131.
- [14]. Ma, G., et al. (2008). "Preparation and characterization of water-soluble N-alkylated chitosan." **Carbohydrate Polymers** 74(1): 121-126.
- [15]. Nunthanid, J., et al. (2004). "Characterization of chitosan acetate as a binder for sustained release tablets." **Journal of Controlled Release** 99(1): 15-26.
- [16]. Tien, C.L., et al. (2003). "N-acylated chitosan: hydrophobic matrices for controlled drug release." **Journal of Controlled Release** 93(1): 1-13.
- [17]. Shelma, R. and C. Sharma. (2010). "Acyl modified chitosan derivatives for oral delivery of insulin and curcumin." **Journal of Materials Science: Materials in Medicine** 21(7): 2133-2140.
- [18]. Yang, T., C. Chou, and C. Li. (2002). "Preparation, water solubility and rheological property of the N-alkylated mono or disaccharide chitosan derivatives." **Food Research International** 35(8): 707-713.
- [19]. Tian, Q., et al. (2011). "Self-Assembly and liver targeting of sulfated chitosan nanoparticles functionalized with glycyrrhetic acid." **Nanomedicine: Nanotechnology, Biology and Medicine** (Article in press).
- [20]. Champagne, L.M. (2008). "The synthesis of water soluble /n-acyl chitosan derivatives for characterization as antibacterial agents." Ph.D. Chemistry, Louisiana State University and Agricultural & Mechanical College.
- [21]. Mourya, V.K. and N.N. Inamdar. (2008). "Chitosan-modifications and applications: Opportunities galore." **Reactive and Functional Polymers** 68(6): 1013-1051.

- [22]. Francesko, A. and T. Tzanov. (2011). "Chitin, chitosan and derivatives for wound healing and tissue engineering." **Advances Biochemical Engineering and Biotechnology** 125: 1-27.
- [23]. Shigemasa, Y., et al. (1999). "Chemical modification of chitin and chitosan 1: preparation of partially deacetylated chitin derivatives via a ring-opening reaction with cyclic acid anhydrides in lithium chloride/N,N-dimethylacetamide." **Carbohydrate Polymers** 39(3): 237-243.
- [24]. Sashiwa, H. and S. Aiba. (2004). "Chemically modified chitin and chitosan as biomaterials." **Progress in Polymer Science** 29(9): 887-908.
- [25]. Zhou, J.Q. and J.W. Wang. (2009). "Immobilization of alliinase with a water soluble-insoluble reversible N-succinyl-chitosan for allicin production." **Enzyme and Microbial Technology** 45(4): 299-304.
- [26]. Aiping, Z., et al. (2006). "Synthesis and characterization of N-succinyl-chitosan and its self-assembly of nanospheres." **Carbohydrate Polymers** 66(2): 274-279.
- [27]. Hou, Z., et al. (2010). "Synthesis and evaluation of N-succinyl-chitosan nanoparticles toward local hydroxycamptothecin delivery." **Carbohydrate Polymers** 81(4): 765-768.
- [28]. Sui, W., et al. (2008). "Preparation and properties of an amphiphilic derivative of succinyl-chitosan." **Colloids and Surfaces A: Physicochemical and Engineering Aspects** 316: 171-175.
- [29]. Mello, K., et al. (2006). "Synthesis and physicochemical characterization of chemically modified chitosan by succinic anhydride." **Brazilian Archives of Biology and Technology** 49(4): 665-668.
- [30]. Yan, C., et al. (2006). "Preparation of N-succinyl-chitosan and its physical-chemical properties as a novel excipient." **Yakugaku zasshi: Journal of the Pharmaceutical Society of Japan** 126(9): 789-793.
- [31]. Aiedeh, K. and M.O. Taha. (1999). "Synthesis of chitosan succinate and chitosan phthalate and their evaluation as suggested matrices in orally administered, colon-specific drug delivery systems." **Archiv der Pharmazie - Pharmaceutical and Medicinal Chemistry** 332(3): 103-107.

- [32]. Pillai, C.K.S., W. Paul, and C.P. Sharma. (2009). "Chitin and chitosan polymers: Chemistry, solubility and fiber formation." **Progress in Polymer Science** 34(7): 641-678.
- [33]. George, M. and T.E. Abraham. (2006). "Polyionic hydrocolloids for the intestinal delivery of protein drugs: Alginate and chitosan - a review." **Journal of Controlled Release** 114(1): 1-14.
- [34]. Dutta, P.K., J. Dutta, and V.S. Tripathi. (2004). "Chitin and chitosan: Chemistry, properties and applications." **Journal of Scientific and Industrial Research** 63: 20-31.
- [35]. Paños, I., N. Acosta, and A. Heras. (2008). "New drug delivery systems based on chitosan." **Current Drug Discovery Technologies** 5: 333-341.
- [36]. Wang, M.-J., et al. (2009). "A Novel, Potential Microflora-Activated Carrier for a Colon-Specific Drug Delivery System and Its Characteristics." **Industrial & Engineering Chemistry Research** 48(11): 5276-5284.
- [37]. Caner, C., P.J. Vergano, and J.L. Wiles. (1998). "Chitosan Film Mechanical and Permeation Properties as Affected by Acid, Plasticizer, and Storage." **Journal of Food Science** 63(6): 1049-1053.
- [38]. Kalia, S. and L. Averous. (2011). **Biopolymers: Biomedical and Environmental Applications**. John Wiley & Sons, Inc.
- [39]. Britto, D. and O.B.G. Assis. (2007). "Synthesis and mechanical properties of quaternary salts of chitosan-based films for food application." **International Journal of Biological Macromolecules** 41(2): 198-203.
- [40]. Britto, D. and O.B.G. Assis. (2007). "A novel method for obtaining a quaternary salt of chitosan." **Carbohydrate Polymers** 69(2): 305-310.
- [41]. Pang, H., et al. (2008). "Preparation and function of composite asymmetric chitosan/CM-chitosan membrane." **Journal of Materials Science: Materials in Medicine** 19(3): 1413-1417.
- [42]. Srinivasa, P.C., M.N. Ramesh, and R.N. Tharanathan. (2007). "Effect of plasticizers and fatty acids on mechanical and permeability characteristics of chitosan films." **Food Hydrocolloids** 21(7): 1113-1122.

- [43]. Bigin, A. and M.-R. Van Calsteren. (1999). "Antimicrobial films produced from chitosan." **International Journal of Biological Macromolecules** 26(1): 63-67.
- [44]. Bourtoom, T. (2008). "Edible films and coatings: characteristics and properties." **International Food Research Journal** 15(3): 1-12.
- [45]. Khan, T.A. and K.K. Peh. (2003). "A preliminary investigation of chitosan film as dressing for punch biopsy wounds in rats." **Journal of Pharmaceutical Sciences** 6(1): 20-26.
- [46]. Kaur, K. and K. Kim. (2009). "Studies of chitosan/organic acid/Eudragit RS/RL-coated system for colonic delivery." **International Journal of Pharmaceutics** 366: 140-148.
- [47]. Ilium, L. (1998). "Chitosan and Its Use as a Pharmaceutical Excipient." **Pharmaceutical Research** 15(9): 1326-1331.
- [48]. Hejazi, R. and M. Amiji. (2003). "Chitosan-based gastrointestinal delivery systems." **Journal of Controlled Release** 89(2): 151-165.
- [49]. Chung, Y., C. Tsai, and C. Li. (2006). "Preparation and characterization of water-soluble chitosan produced by Maillard reaction." **Fisheries Science** 72(5): 1096-1103.
- [50]. Bansal, V., et al. (2011). "Applications of Chitosan and Chitosan Derivatives in Drug Delivery." **Advances in Biological Research** 5(1): 28-37.
- [51]. An, N.T., et al. (2009). "Water-soluble N-carboxymethylchitosan derivatives: Preparation, characteristics and its application." **Carbohydrate Polymers** 75(3): 489-497.
- [52]. Choi, C.Y., et al. (2007). "Effect of N-acylation on structure and properties of chitosan fibers." **Carbohydrate Polymers** 68(1): 122-127.
- [53]. Kittur, F.S., et al. (2002). "Characterization of chitin, chitosan and their carboxymethyl derivatives by differential scanning calorimetry." **Carbohydrate Polymers** 49(2): 185-193.
- [54]. Xie, Y., X. Liu, and Q. Chen. (2007). "Synthesis and characterization of water-soluble chitosan derivate and its antibacterial activity." **Carbohydrate Polymers** 69(1): 142-147.

- [55]. Xiao, B., et al. (2011). "Preparation and characterization of antimicrobial chitosan-N-arginine with different degrees of substitution." **Carbohydrate Polymers** 83: 144–150.
- [56]. Shahidi, F. and R. Abuzaytoun. (2005). "Chitin, Chitosan, and Co-Products: Chemistry, Production, Applications, and Health Effects." In **Advances in Food and Nutrition Research**, Volume 49 London: Academic Press: 93-135.
- [57]. Hermanson, G.T. (1996). **Bioconjugate techniques**. San Diego: Elsevier Inc.
- [58]. Qin, C., et al. (2006). "Water-solubility of chitosan and its antimicrobial activity." **Carbohydrate Polymers** 63(3): 367-374.
- [59]. Kato, Y., H. Onishi, and Y. Machida. (2004). "N-succinyl-chitosan as a drug carrier: water-insoluble and water-soluble conjugates." **Biomaterials** 25(5): 907-915.
- [60]. Agency, U.S.E.P. (2000). "Phthalic anhydride." Accessed October 21, 2010. Available from Technology Transfer Network Air Toxics Web Site <http://www.epa.gov/ttn/atw/hlthef/phthalic.html>.
- [61]. Kelley, K.E., et al. (2012). "Identification of phthalates in medications and dietary supplement formulations in the United States and Canada." **Environ Health Perspect** 120(3): 379-384.
- [62]. Raymond, C.R., et al. (2003). "Cellulose Acetate Phthalate." In **Handbook of Pharmaceutical Excipients**. London: Pharmaceutical Press: 143-146.
- [63]. Raymond, C.R., et al. (2003). "Dibutyl Phthalate." In **Handbook of Pharmaceutical Excipients**. London: Pharmaceutical Press: 225-227.
- [64]. Raymond, C.R., et al. (2003). "Diethyl Phthalate." In **Handbook of Pharmaceutical Excipients**. London: Pharmaceutical Press: 230-231.
- [65]. Raymond, C.R., et al. (2003). "Hypromellose Phthalate." In **Handbook of Pharmaceutical Excipients**. London: Pharmaceutical Press: 333-336.
- [66]. Raymond, C.R., et al. (2003). "Polyvinyl Acetate Phthalate." In **Handbook of Pharmaceutical Excipients**. London: Pharmaceutical Press: 562-563.
- [67]. Wuts, P.G.M. and Theodora W. Greene. (2007). "Protection for the Amino Group." In **Greene's Protective groups in organic synthesis**. John Wiley & Sons, Inc.

- [68]. Panchapornpon, D., et al. (2011). "Fabrication of thermally stabilized shellac through solid state reaction with phthalic anhydride." **Materials Letters** 65(8): 1241-1244.
- [69]. Amtex. (2005). "Analytic method for determining degree of substitution in the product (A.S.T.M. Method)." Accessed January 15, 2010. Available from <http://www.amtex.com.mx/docs/DS.pdf>.
- [70]. Sonia, T.A. and C.P. Sharma. (2011). "Chitosan and its derivatives for drug delivery perspective." **Advances in Polymer Science** 243: 23–54.
- [71]. Dong, Y., et al. (2001). "Determination of degree of substitution for N-acetylated chitosan using IR spectra." **Science in China Series B: Chemistry** 44(2): 216-224.
- [72]. Leane, M.M., et al. (2004). "Use of the ninhydrin assay to measure the release of chitosan from oral solid dosage forms." **International Journal of Pharmaceutics** 271: 241-249.
- [73]. Velde, K.V.d. and P. Kiekens. (2004). "Structure analysis and degree of substitution of chitin, chitosan and dibutrylchitin by FT-IR spectroscopy and solid state <sup>13</sup>C NMR." **Carbohydrate Polymers** 58(4): 409-416.
- [74]. Thanou, M., J.C. Verhoef, and H.E. Junginger. (2001). "Oral drug absorption enhancement by chitosan and its derivatives." **Advanced Drug Delivery Reviews** 52(2): 117-126.
- [75]. Yu, S., et al. (2004). "Nasal insulin delivery in the chitosan solution: in vitro and in vivo studies." **International Journal of Pharmaceutics** 281: 11-23.
- [76]. Prajapati, B.G. (2009). "Chitosan A Marine Medical Polymer And Its Lipid Lowering Capacity." **The Internet Journal of Health** 8: (available at [http://www.ispub.com/journal/the\\_internet\\_journal\\_of\\_health/volume\\_9\\_number\\_2\\_13/article/chitosan-a-marine-medical-polymer-and-its-lipid-lowering-capacity.html](http://www.ispub.com/journal/the_internet_journal_of_health/volume_9_number_2_13/article/chitosan-a-marine-medical-polymer-and-its-lipid-lowering-capacity.html)).
- [77]. Kean, T. and M. Thanou. (2010). "Biodegradation, biodistribution and toxicity of chitosan." **Advanced Drug Delivery Reviews** 62(1): 3-11.

- [78]. Huanbutta, K. (2010). "Development of chitosan nano/microparticles for colonic drug delivery." Ph.D. Pharmaceutical Technology, Silpakorn University.
- [79]. Kean, T., S. Roth, and M. Thanou. (2005). "Trimethylated chitosans as non-viral gene delivery vectors: Cytotoxicity and transfection efficiency." **Journal of Controlled Release** 103(3): 643-653.
- [80]. Chakraborty, S., S. Sarkar, and S.K. Debnath. (2009). "Formulation Development and Evaluation of Pantoprazole Enteric Coated Tablets." **International Journal of ChemTech Research** 1(3): 663-666.
- [81]. Gad, S.C. (2008). **Pharmaceutical manufacturing handbook: production and processes**. North Carolina: John wiley & sons, Inc.
- [82]. Moore, G.K. and G.A.F. Roberts. (1980). "Determination of the degree of deacetylation of chitosan." **International Journal of Biological Macromolecules** 2(2): 115-116.
- [83]. Luangtana-anan, M., et al. (2007). "Effect of salts and plasticizers on stability of shellac film." **Journal of Agricultural and Food Chemistry** 55: 687-692
- [84]. Zavareze, E.d.R., et al. (2012). "Development of oxidised and heat-moisture treated potato starch film." **Food Chemistry** 132(1): 344-350.
- [85]. Zhang, C., et al. (2003). "Synthesis and characterization of water-soluble O-succinyl-chitosan." **European Polymer Journal** 39(8): 1629-1634.
- [86]. Hirano, S. and T. Moriyasu. (2004). "Some novel N-(carboxyacyl)chitosan filaments." **Carbohydrate Polymers** 55(3): 245-248.
- [87]. Nunthanid, J., et al. (2001). "Physical properties and molecular behavior of chitosan films." **Drug Development and Industrial Pharmacy** 27(2): 143-157.
- [88]. Huanbutta, K., et al. (2011). "Swelling kinetics of spray-dried chitosan acetate assessed by magnetic resonance imaging and their relation to drug release kinetics of chitosan matrix tablets." **European Journal of Pharmaceutics and Biopharmaceutics** 77(2): 320-326.

- [89]. Casy, A.F. and G.H. Dewar. (1994). "Captopril and its probable contaminants: NMR and MS features of analytical value." **Journal of Pharmaceutical and Biomedical Analysis** 12(7): 855-861.
- [90]. Mustafa, R., et al. (2009). "Synthesis and characterization of rigid aromatic-based epoxy resin." **Malaysian Polymer Journal** 4(2): 68-75.
- [91]. Kim, J.H. and O. World Health. (2009). **Cyclic acid anhydrides: human health aspects**. Stuttgart: World Health Organization.