

GUM/RUBBER (incl. Latex, Resin, Pectin, Mucilage, Cellulose, etc.)

NPARR 2(1), 2011-051, Chemical characterization of pectin from green tea (*Camellia sinensis*)

From green tea leaves, two distinct pectin fractions were obtained based on their solubility in water. Polyphenols were detected only in the easily water soluble fraction (P1). The estimated uronic acids/neutral sugars ratio was 1.7 in the easily water soluble pectin fraction (P1), and 1.0 in the less water soluble fraction (P2). Homogalacturonan sequences (HGAs) corresponded to about 62% of the P1 pectin fraction but only 47% of the P2 fraction. After degradation of the two pectin fractions by pectin lyase, chemical studies revealed rhamnogalacturonan RG I and RG II regions present in the P1 pectin fraction, whereas only RG I sequences were detected in the P2 pectin fraction. The degree of substitution was lower for HGAs of the P1 pectin fraction than P2. Different acetylation patterns for the two fractions were observed. Polyphenols extracted simultaneously with pectins were present only in HGA fractions from P1. [Jean-Pierre Ele-Ekouna, Corinne Pau-Roblot*, Bernard Courtois and Josiane Courtois (Laboratoire des Polysaccharides Microbiens et Végétaux, Université de Picardie Jules Verne, IUT d'Amiens, dept GB, Avenue des Facultés, Le Bailly, 80025 Amiens cedex, France), *Carbohydrate Polymers*, 2011, **83**(3), 1232-1239].

NPARR 2(1), 2011-052, Pasting and rheological properties of oat starch and its derivatives

Modification of starch led to new product with new desirable properties. Oat starch was subjected to different chemical modifications (acetylation, oxidation and phosphorylation). These processes greatly influenced physico-chemical properties of starch. There were observed shifts in molecular mass, as well as in amylose, lipid and phosphorus content. Also some changes were observed in gelatinization characteristics of starches, the most visible in case of acetylated starch. Introduction of functional groups greatly increased such starch properties, in comparison to native one, like water binding capacity (WBC) and aqueous solubility (AS). Also the influence of chemical modifications on rheological

properties of oat starch pastes were investigated. Pasting characteristics of 5.00% starch suspensions were performed. For acetylated and starch phosphate pasting curves had a similar course. The other group of pasting curves was created by viscosity profiles obtained for oxidized and native starches. Rheological properties of 4.00%, w/w starch pastes were evaluated based on flow curves and results of equilibrium tests. Power law rheological models were fitted to the obtained data. All pastes were classified as shear thickened fluids. Flow index values were practically temperature independent, with exception for native starch paste. Yield stress values were calculated for pastes at 20 °C, but were impossible to determine for acetylated starch due to sample gelling. Rheological properties of starch pastes and pasting characteristics were compared. The viscosity oscillations of native and oat starch phosphate pastes were observed. Possible reasons of thixotropy behavior occurrence at 20 °C, and its vanishing at 50 °C were discussed [W. Berski*, A. Ptasek, P. Ptasek, R. Ziobro, G. Kowalski, M. Grzesik and B. Achremowicz (Faculty of Food Technology, Agricultural University in Krakow, PL-30-149 Krakow, ul. Balicka 122, Poland), *Carbohydrate Polymers*, 2011, **83**(2), 665-671

NPARR 2(1), 2011-053, Plasticization of corn starch by polyol mixtures

Polyol mixtures including mixture of conventional plasticizer glycerol and higher molecular weight polyol (HP) such as xylitol, sorbitol and maltitol were used to plasticize corn starch by melt-blending method, and effect of the polyol mixture on the processability, microstructures, thermal stability and mechanical properties of these starch composites (SC) were investigated. The introduction of HP providing greater processing torque can dramatically reduce the strong molecular chain interaction in starch without obvious residual starch granules in the starch composites. The increasing of the molecular weight and content of HP in polyol mixture is beneficial for the significant enhancement of the thermal stability and mechanical strength of the starch composite. Meanwhile, the addition of HP besides conventional glycerol increases the modulus and phase transition temperature of the starch composite too [Xiuying Qiao*, Zhongzhu Tang and Kang Sun ((State Key Laboratory of Metal Matrix Composites, Shanghai

Jiao Tong University, 800 Dong Chuan Road, Shanghai, 200240, PR China), *Carbohydrate Polymers*, 2011, 83(2), 659-664].

NPARR 2(1), 2011-054, Biochemical profiling of mucilage extracted from seeds of different citrus rootstocks

Hetero-polysaccharide mucilage was extracted from the seed coats of different citrus rootstocks viz. Rough lemon, Sachion citrumelo and Yuma citrange for investigating its biochemical and molecular properties. Investigations showed that the mucilage contained (mg/g) starch 3.13–5.04; maltose 3.23–4.31; glucosamine 0.017–0.289; d-xylose 0.059–0.107 and total soluble sugars 8.13–11.82. Specific enzyme activities were 16.98–35.96, 30.60–98.45, 42.00–73.98, 660.98–738.35 and 7.660–19.27 IU mg⁻¹ of protein for protease, amylase, catalase, peroxidase and superoxide dismutase, respectively. Proximate analysis showed 12.85–13.94% moisture, 11.25–14.06% crude protein, 0.31–0.86% crude lipid, 1.31–2.69% crude fibre, 2.95–3.45% ash and 81.48–91.49 kJ 100 g⁻¹ energy. The comparative characterization of the extractable proteins was profiled by SDS-PAGE and quantified using Bradford assay. Structural properties of samples were analyzed and compared using Fourier transformation infrared (FT-IR) spectroscopy [Summar A. Naqvi, M.M. Khan, M. Shahid, M.J. Jaskani, Iqar A. Khan, Mohammad Zuber and Khalid Mahmood Zia*(Citrus Nursery Sanitation Laboratory, Institute of Horticultural Sciences, University of Agriculture, Faisalabad, 38040, Pakistan), *Carbohydrate Polymers*, 2011, 83(2), 623-628].

NPARR 2(1), 2011-055, Extraction of antioxidant pectic-polysaccharide from mangosteen (*Garcinia mangostana*) rind: Optimization using response surface methodology

Box-Behnken design (BBD) was employed to optimize the incubator temperature (X_1 : 50–80 °C), extraction time (X_2 : 2–4 h) and pH (X_3 : 2–4) to obtain a high antioxidant pectic-polysaccharide yield with high uronic acid content and antioxidant activity from mangosteen rind. Analysis of variance showed that the contribution of quadratic model was significant for the extraction yield and antioxidant activity whereas linear model was significant for pectin

content. Optimization study using response surface methodology was performed and 3D response surfaces were plotted from the mathematical model. Two optimal conditions were given: condition (1) $X_1 = 80.0$ °C; $X_2 = 3.93$ h; $X_3 = 2.45$, and condition (2) $X_1 = 67.7$ °C; $X_2 = 3.67$ h; $X_3 = 2.00$. These optimum conditions yielded pectic-polysaccharide of 12.0–12.4%, uronic acid content of 20.2–21.1 mg/g, and %DPPHsc/g extract of 225–252, respectively. Close agreement between experimental and predicted values was found. This could therefore be applied in extraction of mangosteen-derived functional pectic-polysaccharide in industry [Chee-Yuen Gan* and Aishah A. Latiff (Doping Control Centre, University Sains Malaysia, 11800 USM, Penang, Malaysia), *Carbohydrate Polymers*, 2011, 83(2), 600-607].

NPARR 2(1), 2011-056, Flocculating and suspending properties of commercial citrus pectin and pectin extracted from pomelo (*Citrus maxima*) peel

The aim of this study was to extend the application of pectin extracted from pomelo peel to pharmaceutical suspensions. Particularly, the influence of pectin on the stability of indomethacin suspension was investigated. The use of cation, type and concentration of pectin, pH and temperature influenced the flocculating activity of pectin in suspension. The extracted pectin has comparable activity to commercial pectins. Low concentration of pectin and ferric ions allowed obtaining indomethacin suspensions with adequate properties, i.e., suitable stability and redispersibility. The use of pectin as a suspending agent was achieved with higher concentration; the flocculated, redispersible and stable indomethacin suspension could be produced. The pharmaceutical suspension containing pectin as a flocculating or suspending agent may be applied as liquid drug delivery system for pediatric and geriatric patients [Suchada Piriayaprasarth and Pornsak Sriamornsak*(Department of Pharmaceutical Technology, Faculty of Pharmacy, Silpakorn University, Nakhon Pathom 73000, Thailand), *Carbohydrate Polymers*, 2011, 83(2), 561-568

NPARR 2(1), 2011-057, Preliminary study of *Anacardium occidentale* gum as binder in formulation of paracetamol tablets

An attempt was made to investigate the binding efficacy of cashew nut tree gum in tablet formulation in comparison with standard binders such as acacia and polyvinyl pyrrolidone (PVP K-30). The paracetamol granules were prepared with different concentration of the gum as binder by wet granulation method. The granules were evaluated and found to be satisfactory for preparing compressed tablets. The tablets were prepared from the granules by hydraulic hand press and evaluated for volume of tablet, apparent density, porosity, relative density (or) packing fraction, percentage elastic recovery, tablet physical stability, content uniformity, weight variation, hardness, friability, disintegration time, *in vitro* dissolution studies and surface analysis by SEM. Formulations containing the minimum concentration of 2.5% cashew nut tree gum as binding agent show short disintegration and fast dissolution including good physico-mechanical properties. The result suggests that cashew nut tree gum can be used as an alternative binder with 2.5% concentration to produce a tablet of better mechanical strength and dissolution profile of particular drug substance [K. Gowthamarajan*, G. Kanaka Phani Kumar, Narayan Babulal Gaikwad and B. Suresh (Department of Pharmaceutics, School of Pharmaceutical Sciences, Karpagam University, Coimbatore, Tamilnadu, India), *Carbohydrate Polymers*, 2011, 83(2), 506-511].

NPARR 2(1), 2011-058, Effects of high pressure homogenization on rheological properties of flaxseed gum

The effects of high pressure homogenization on the rheological properties of flaxseed gum solution were analyzed in this study. The apparent viscosity of flaxseed gum was decreased by increasing homogenization pressure, while the temperature of the solution was gradually increased at the same time. The consistency index and the flow behavior index in the Power Law model of apparent viscosity were also modeled with Power Law and logarithm equations,

respectively. The decay in parameters of storage and loss modulus model was also found along with the increasing homogenization pressure. Although no effect of pressure on conductivity and gelling temperature was significant, the clarity of the flaxseed gum was increased by increasing pressure. The activation and zeta potential of the flaxseed gum showed similar trends with the homogenization pressure, which were first increased then decreased from 30 MPa [Yong Wang, Dong Li*, Li-Jun Wang and Jun Xue (College of Engineering, China Agricultural University, P.O. Box 50, 17 Qinghua Donglu, Beijing 100083, China), *Carbohydrate Polymers*, 2011, 83(2), 489-494].

NPARR 2(1), 2011-059, Pectins from *Canna edulis* Ker residue and their physicochemical characterization

Water-soluble pectin (WSP), chelated-soluble pectin (CSP) and acid-soluble pectin (ASP) were sequentially extracted from *Canna edulis* Ker residue, a by-product after the extraction of starch, and their physicochemical properties were studied. ASP was further separated through preparative column chromatography, leading to isolation of two fractions, ASPI and ASPII, which chemical features were analyzed by GC, GC-MS and NMR. Moreover, their behaviors in the simulated gastric and intestinal fluid were monitored. The results exhibit that *C. edulis* residue contains high amount of ASP derived from the heteropolysaccharide with rhamnogalacturonan as main chain. Furthermore, three pectins show gel formation and dissolution behaviors. It well suggests that *C. edulis* residue can be exploited for a good source of pectin for functional materials [Juan Zhang, Zheng-Wu Wang*, Wen-Juan Yu and Jin-Hong Wu (Department of Food Science and Technology, School of Agriculture and Biology, Shanghai Jiao Tong University, 800 Dongchuan Road, Minhang District, Shanghai 200240, China), *Carbohydrate Polymers*, 2011, 83(1), 210-216].