

## Effect of soaking natural rubber latex films in potassium hydroxide solution

The scientists at Malaysia soaked natural rubber latex films in potassium hydroxide solution of various pH to investigate the effects of soaking on the crosslink density, extractable protein content and tensile properties of the films. Potassium hydroxide solution was believed to be effective in reducing extractable

protein content by leaching out the extractable protein from natural rubber latex films. Results showed that crosslink density and the extractable protein content of the films reduced with increasing pH of the KOH solution. The tensile properties, except elongation at break, reduce when pH of KOH solution is above

12. Extractable protein content was reduced especially when the pH of the solution was greater than 12.0 [Maznah K Siti, Baharin A, Hanafi I, Azhar ME and Hakim MH Mas Rosemal, Effect of soaking in potassium hydroxide solution on the curing, tensile properties and extractable protein content of natural rubber latex films, *Polym Test*, 2008, 27(8), 1013-1016].

## Effect of flaxseed gum addition on rheological properties of native maize starch

The scientists at China and Turkey jointly studied the effect of flaxseed gum addition on rheological properties of native maize starch. During experiment both small amplitude oscillatory and steady shear measurements were carried out at 25°C, 50°C and 75°C in order to determine the rheological properties of the mixtures of flaxseed gum (0.1-0.5%) and native maize starch (3%). It was found that the apparent viscosities of the samples

increased with the increasing of flaxseed gum concentration. The apparent viscosities of the samples were fitted well to the power law model (the values of  $R^2$  were between 0.954 and 0.999). The consistency index ( $K$ ) of the gum-starch mixtures increased with the increasing of flaxseed gum concentration. The gum-starch mixtures showed gel-like behaviour since the storage modulus ( $G'$ ) was much larger than the loss modulus ( $G''$ ) and

the frequency dependence of both modulus was not significant. The  $G'$  and  $G''$  of the gum-starch mixtures was increased with the increasing of flaxseed gum concentration. The influence of temperature was more significant for the flaxseed gum-maize starch mixtures compared to maize starch gel [Wang Yong, Wang Li-Jun, Li Dong, Özkan Necati, Chen Xiao Dong and Mao Zhi-Huai, Effect of flaxseed gum addition on rheological properties of native maize starch, *J Food Eng*, 2008, 89(1), 87-92].

## Global conformation analysis of irradiated xyloglucans

Xyloglucan isolated and purified from tamarind seed was subjected to various degrees of  $\gamma$ -irradiation treatments, from 10 to 70 kGy, monitored for radiation damage and then studied by researchers of UK, Slovakia, Czech Republic, Spain and Canada using a new combined hydrodynamic approach with regards to conformation and flexibility. Radiation products were analysed with regard to molecular weight (weight average)  $M_w$  from size exclusion

chromatography coupled to multi-angle laser light scattering (SEC-MALLs), intrinsic viscosity  $[\eta]$  and sedimentation coefficient  $s_{20,w}^o$ . Sedimentation coefficient distributions and elution profiles from SEC-MALLs confirmed the unimodal nature of the molecular weight distribution for each sample in solution. The chain flexibility was then investigated in terms of the persistence length,  $L_p$  of the equivalent worm-like chain model. Biomacromolecules yielded an estimate

for  $L_p$  in the range 4-9 nm using floated and fixed mass per unit length analysis protocols and "point" global analysis: irradiated xyloglucans behave as flexible structures in common with pressure/heat treated materials [Patel Trushar R, Morris Gordon A, Ebringerová Anna, Vodenicarová Melita, Velebný Vladimír, Ortega Alvaro, Garcia Jose de la Torre and Harding Stephen E, Global conformation analysis of irradiated xyloglucans, *Carbohydr Polym*, 2008, 74(4), 845-851].

## Enzymatic modification of cassava starch by fungal lipase

Esterification of starch was carried out by researchers of National Institute for Interdisciplinary Science & Technology (Formerly Regional Research Laboratory), CSIR, Thiruvananthapuram, India to expand the usefulness of starch for a myriad of industrial applications. Lipase obtained from *Candida rugosa* (lipase AYS) was used for starch esterification by two methods: liquid state and microwave oven. The esterification of cassava starch with recovered coconut oil (lauric acid) using microwave heating gave a degree of substitution of 55.28% with degree of substitution (DS) 1.1 and liquid state esterification with palmitic acid gave a degree of substitution of 65.86% with DS 1.04. Esterification was confirmed by IR spectroscopy studies. Thermal gravimetric analysis (TGA) showed that the higher DS attributed to the thermostability, since onset of decomposition is at a higher temperature (390°C) than the unmodified (280°C) and was stable above 600°C.  $\alpha$ -Amylase digestibility was found to be reduced for modified starch compared to the control (76.5-4.6%). Viscosity differed with the acyl donor used, palmitic acid increased viscosity while hydrolysed coconut oil reduced viscosity of modified starch ester. Esterification of starch with long chain fatty acids like palmitic acid gives thermoplastic starch which has got wide use in plastic industry, pharmaceutical industries and in biomedical applications such as materials for bone fixation and replacements, carriers for controlled release of drugs and other bioactive agents. Unlike chemical esterification, enzymatic esterification is ecofriendly and avoids the use of nasty solvents [Rajan Akhila, Sudha JD and Abraham T Emilia, Enzymatic modification of cassava starch by fungal lipase, *Ind Crops Prod*, 2008, 27(1), 50-59].

## Developing lignin-based resin coatings and composites

Phenol in phenol formaldehyde (PF) resin has been partly substituted with lignin extracted from sugarcane bagasse by researchers of Australia. In order to optimize the lignin-based resin for applications in coating and composite materials, thermal and rheological tests were performed with different wt% of lignin substitution into PF resins. Differential scanning calorimetry scans showed a small exothermic peak and a large endothermic peak, typical of resins. The  $T_g$  of the resins was seen between 125 and 150°C and this transition was clearly evident when the lignin content was increased from 10 to 40 wt%. Increasing the lignin content in the PF resin increases the rate of cure and the heat of reaction. Water absorption tests show that the lignin-PF resin films are effective water-barrier coatings for cardboard substrates. It is speculated that the interaction between the substrate and the lignin-PF resin has resulted in a negative surface charge which would have contributed to the reduction in the contact angle [Park Yoosup, Doherty WOS and Halley Peter J, Developing lignin-based resin coatings and composites, *Ind Crops Prod*, 2008, 27(2), 163-167].

## Global hydrodynamic analysis of the molecular flexibility of galactomannans

In the past, intrinsic viscosity and sedimentation velocity analyses have been used separately to assess the conformation and flexibility of guar and locust bean gum galactomannans based on worm-like chain and semi-flexible coil models. Publication of a new global method combining data sets of both intrinsic viscosity and sedimentation coefficient with molecular weight, and minimizing a target (error) function now permits a more robust analysis. Researchers of UK and Spain use this approach and found that values for the persistence length of (10±2) nm for guar and (7±1) nm for locust bean gum are returned if the mass per unit length  $M_L$  is floated as a variable. Using a fixed mass per unit length based on the known compositional data of each galactomannan yields a similar value for  $L_p$  in both cases, (8±1) nm for guar and (9±1) nm for locust bean gum, with combined set of data yielding (9±1) nm: within experimental error the flexibilities of both galactomannans are very similar [Morris Gordon A, Patel Trushar R, Picout David R, Ross-Murphy Simon B, Ortega Alvaro, de la Torre Jose Garcia and Harding Stephen E, Global hydrodynamic analysis of the molecular flexibility of galactomannans, *Carbohydr Polym*, 2008, 72(2), 356-360].

### Structure and chain conformation of a (1→6)- $\alpha$ -d-glucan from the root of *Pueraria lobata* (Willd.) Ohwi and the antioxidant activity of its sulfated derivative

A water soluble glucan, PLB-2C, was isolated from the water extract of the root of *Pueraria lobata* (Willd.) Ohwi using anion-exchange and gel permeation chromatography by scientists of China. Its structure was investigated by gas chromatography (GC), gas chromatography-mass spectrometry (GC-MS), infrared (IR) spectra, and nuclear magnetic resonance (NMR)

spectroscopy of heteronuclear single quantum coherence (HSQC) and heteronuclear multiple bond correlation (HMBC) techniques. The results indicated that PLB-2C was a linear glucan composed of (1→6)- $\alpha$ -d-Glcp. Chain conformation study showed that the polysaccharide took random coil compact conformation. *In vitro* cell viability assay by MTT method, its sulfated derivative PLB-2CS which was

substituted at 2-O, 3-O, 4-O positions, at 0.1, 1, and 5 mg/ml, could attenuate PC12 cell damage significantly caused by hydrogen peroxide [Cui Hengxiang, Liu Qin, Tao Yongzhen, Zhang Hongfeng, Zhang Lina and Ding Kan, Structure and chain conformation of a (1→6)- $\alpha$ -d-glucan from the root of *Pueraria lobata* (Willd.) Ohwi and the antioxidant activity of its sulfated derivative, *Carbohydr Polym*, 2008, 74 (4), 771-778].

### Effect of extracting time and temperature on yield of gelatin from different fish offal

The aim of the study conducted by scientists of Poland was to determine the optimal conditions for preparing gelatin from different kinds of fish offal: heads and backbones of Baltic cod, skins of fresh and cold-smoked salmon, and skins of salted and marinated herrings. The yield of gelatin extraction at 45°C was 71-75% for fresh salmon skins or cod backbones, and 86%, for smoked salmon

skins. When heating marinated herring skins for 15 min or salted herring skins for 45 min, about 100% of collagen was converted to gelatin. For fish skins, 45°C and 15-60 min extraction time, depending on the kind of skins, were established as optimal conditions for preparing gelatin. The yield of gelatin extraction from the cod heads did not exceed 70%, even when a three stages process was used. In the

case of backbones, 100% of collagen in the form of gelatin was isolated using this procedure. SDS-PAGE analysis showed that gelatin from fish skins was much less degraded than gelatin from pig skins [Ilona Kolodziejaska, Elzbieta Skierka, Maria Sadowska, Wiktor Kolodziejski and Celina Niecikowska, Effect of extracting time and temperature on yield of gelatin from different fish offal, *Food Chem*, 2008, 107(2), 700-706].

## Insecticides/Fungicides/Nematicides

### Evaluation of various plant extracts for their nematicidal efficacies against juveniles of *Meloidogyne incognita*

The scientists at Sudan and Korea collected various parts like leaves, fruits and stems of twenty-seven species belonging to different genera from Gezira locality, Sudan. Methanol or hexane extracts of the 27 samples were screened for nematicidal activity against second-



*Chenopodium album*

stage juveniles of *Meloidogyne incognita* in the laboratory. The juveniles

were exposed to 500ppm of each plant extract for 24, 48 and 72h. Five plant extracts exhibited highly promising mortality rates of 95-99% after 72h of exposure, which were statistically different from the other extracts. These extracts were from *Dinbera retroflexa*