

sugar feeding of the bees or adulteration by direct addition of sucrose. The ratio fructose to glucose was also evaluated, because it is suggested that it can be used to typify honey samples from different origins and also indicates the crystallisation tendency.

Honey quality can also be affected by heating during extracting, liquefying or clarifying processes or by aging during storage with production of 5-hydroxymethylfurfuraldehyde. This compound was quantified by HPLC-UV. Some other physicochemical quality parameters were also carried out according to the Official Portuguese Methods (NP-1307, Port. no. 449/76) and Codex Alimentarius Commission (1968) in order to determine moisture, ash content, diastase activity, total acidity and water insoluble solids. The chemical characteristics of the samples investigated in this study generally agreed with the major national and international honey specifications.

### Preparation of Starch Esters

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Several hydrophobic starch fatty acid esters have been synthesised from both maize and potato starch which may have potential industrial application as surface coating materials. Maize and potato starch esters were prepared under heterogeneous reaction conditions, using the corresponding acid anhydride and pyridine via a nucleophilic acyl substitution reaction, in dimethylformamide. The starch esters synthesised varied in both degree of substitution (D.S.) and ester group configuration. Esterifying reagents varying in range from two (acetic anhydride) to six (hexanoic anhydride) carbon atoms were utilised. The preparation of maize starch acetate was also investigated as a function of time. Although up to forty-eight hours was utilized for the reaction time, it was found that the D.S. increased only slightly after three hours after the esterifying reagent had been added. Maize and potato starch hexanoate were also synthesised from hexanoyl chloride under heterogeneous reaction conditions using dimethylformamide (DMF) as the reaction medium. The starch esters were then characterised in terms of ester bond formation by Fourier transform infrared spectroscopy (FT-IR) and determination of D.S. by proton nuclear magnetic resonance spectroscopy (<sup>1</sup>H-NMR). D.S. values varied between 0.5–2.5. Trends regarding starch source and ester group chain length were then evaluated, which indicate that generally maize starch produces higher D.S. value esters than potato starch, and that the longer the acid anhydride acyl chain the lower the D.S. value ester obtained. The solubility profiles of the starch ester derivatives have also been evaluated for a range of organic solvents.

### Preparation and Characterization of Hydrogels Based on Sucrose Modified with Glycidyl Methacrylate

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Recently, various hydrogels containing sugars have been developed. Due to its low price and high production (more than 100 million tons per year), sucrose would be particularly

important for this purpose. Although many authors referred the modification of this sugar with vinyl monomers by chemical methods, not much work has been done on the study of its application as monomers for hydrogels which could be of use as materials for drug delivery systems, bioimplants, contact lenses, etc.

In this work we wish to report some of the work that we have been doing to modify sucrose with glycidyl methacrylate and its application as a monomer for the synthesis of a copolymer containing hydroxyethyl methacrylate. In the first part of this project the introduction of a vinyl group in sucrose was carried out by reacting the disaccharide with glycidyl methacrylate. The product obtained was characterised by NMR and FTIR, showing the modification of the sugar. In the second part of the work, copolymers of hydroxyethyl methacrylate and the modified sucrose were prepared. The hydrogels were characterised physically and chemically by determining their water sorption capacity, their possibility of use as a drug delivery system and their structure by differential scanning calorimetry (DSC).

### Preparation and Characterization of Hydrogels Based on Sucrose Modified with Acryloyl Chloride

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In this work we wish to report some of the work that we have been doing to modify sucrose with acryloyl methacrylate and its application as a monomer for the synthesis of a copolymer containing acrylamide. In the first part of this project the introduction of a vinyl group in sucrose was carried out by reacting the disaccharide with acryloyl chloride. The product obtained was characterised by NMR and FTIR, showing the modification of the sugar. In the second part of the work, copolymers of acrylamide and the modified sucrose were prepared. The hydrogels were characterised physically and chemically by determining their water sorption capacity, their possibility of use as a drug delivery system and their structure by differential scanning calorimetry (DSC).

### Preliminary Studies of Baía Orange Peel Pectins

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One of the applications of pectins are based upon their ability to form gels. This ability is in turn dependent on the molecular properties of these polysaccharides namely, molecular weight, degree of esterification, terogeneity, degree of amidation, and the presence of acetyl groups at O-2 or O-3.

The yield and quality of pectins depends strongly on the