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USING MICROWAVES TO EXTRACT AND MAKE FUNCTIONAL NATURAL OR BIO-SOURCED MACROMOLECULES

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Microwave irradiation is a way to quickly introduce energy within a chemical system differing from conventional heating techniques. Besides this energy input, this process allows reducing the quantity of organic solvent necessary for reactions, substituting an aqueous medium, bio-sourced or renewable solvents, introducing atoms economy. We present two examples in using microwaves irradiation with bio-sourced materials: the extraction of saponins from soapnuts, and the chemical modification of a polysaccharide, chitosan. Synthetic surfactants are widely used in emulsion polymerization, but it is increasingly desirable to replace them with naturally derived molecules with a reduced environmental burden. Saponins were used as biodegradable and renewable surfactants for emulsion polymerization. This chemical has been extracted from soapnuts by microwave assisted extraction and characterized in terms of surfactant properties prior to emulsion polymerization. The results in terms of particle size distribution and morphology control have been compared to those obtained with classical nonionic (NP40) or anionic (SDS) industrial surfactants. Microwave extracted saponins were able to lead to latexes as stable as standard PS latex as showed by the Critical Micellar and Critical Coagulation Concentration measurements. Conventional heating and microwave irradiation have been compared for the synthesis of chitosans grafted with alkyl chains. Reaction

time, temperature and chitosan molar mass have been studied onto the yield of alkylation. All the results tend to prove that microwave assisted synthesis is a powerful method to obtain modified chitosan under extremely low reaction time without any degradation and/or property modifications. Rheological behaviour and interface properties were studied as a function of the yield of alkylation.

Biography

Desbrieres Jacques is Professor at the University of Pau and Pays de l'Adour in France. He completed his Chemical Engineer Degree at National School of Chemistry in Paris (in 1978) and Engineer- Doctorate in Physical Chemistry at Grenoble University (in 1980). He worked for 10 years in Dowell Schlumberger, a service company for oil-well treatments. Then he joined Grenoble University in 1980 as an Associate Professor and then University of Pau and Pays de l'Adour in 2004 as Professor. In 2009, he received the Doctor Honoris Causa Diploma of Technical University "Gheorghe Asachi" in Iasi (Romania) for his contribution towards Natural Polymers Science. His research interests include the controlled chemical modification of polysaccharides, the structure-properties relations, their specific functional properties (rheology, interfacial, interactions) and their applications (food, cosmetics, environment, biomedical). He is the Author or Co-author of around 180 publications and 10 patents.

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