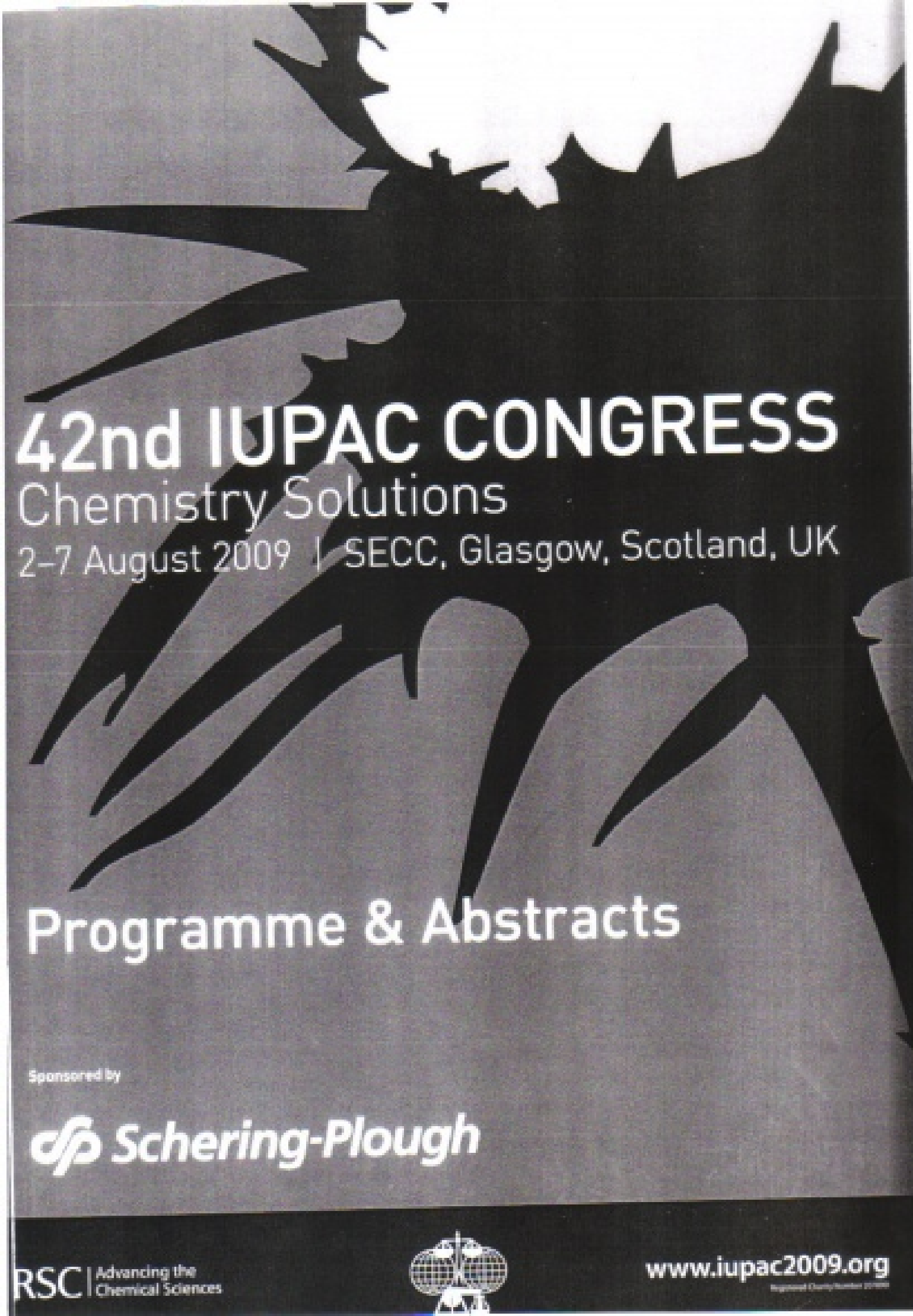
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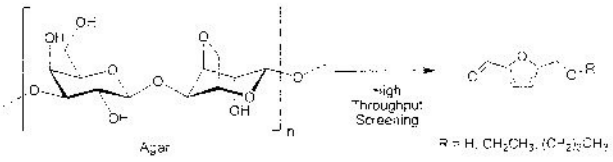
P403_011

High throughput screening of catalytic transformation of renewable galactan into furfural derivatives for fuels and chemicals

Beom Kim, Baekjin Kim, Sangyong Kim, Hyo-Jin Yoon, Yoon-Sik Lee and Jin Ku Cho*

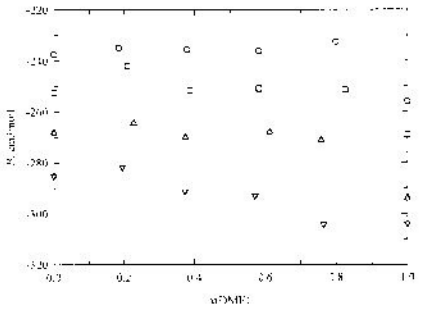


As renewable and sustainable feedstock to replace fossil-based resources, galactan derived from macroalgae was employed as carbohydrate source. High throughput screening of catalytic transformation of agar into furfural derivatives for fuels and chemicals was carried out and reaction conditions were optimized.

P403_012

Alternative biofuels: PVTx measurements for DME + propane

Giovanni Di Nicola,* Matteo Moglie, Giulio Santori and Roman Stryjek



This work reports the experimental results for the dimethyl ether (DME) + propane system obtained using the Burnett method. PVTx measurements were taken for four isotherms (344, 354, 364 and 375 K), performing 16 Burnett expansions. The second and third virial coefficients were derived from experimental results.

P403_013

Brazilian castor oil as raw material for biodiesel production

Ueda Lages,* M. Eduarda. M. Araújo and Ana Cristina Oliveira

Biodiesel, has drawn considerable attention by its properties which are similar to fossil diesel. The transesterification of castor oil was performed in the presence of methanol or ethanol, being the castor oil/alcohol solubility a disadvantage in terms of biofuel/glycerine phase separation, namely when ethanol was used. By RMN, an ester content close to the one required by the EN 14214 was observed using an oil/alcohol molar ratio of 6, 1% of catalyst and 55°C, for the transesterification process.

P403_014

Characterisation of two yeast strains as lipase producers for the vegetal oils transesterification to biodiesel

Ana Aurelia I. Chirvase,* Luminita T. Teacenco, Nicoleta G. Padu and Camelia G. Ungureanu

The paper presents the results of their complete testing to investigate the conditions of lipase formation and the obtained enzymes capacity to catalyse the vegetable oils trasesterification to biodiesel.

*Indicates the presenting author.

Brazilian Castor Oil as Raw Material for Biodiesel Production

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Biodiesel, a biofuel obtained from biomass, has drawn considerable attention by its properties which are similar to fossil diesel. Furthermore, biodiesel is renewable, biodegradable and emits less gaseous pollutants to the atmosphere than normal diesel. In the worldwide biodiesel production, various renewable lipids have been considered as feedstock, including vegetable oils, animal fats, used frying oils and microalgae. The oil extracted from castor seeds (*Ricinus communis L.*) can also be an alternative. Just like other vegetable oils, castor oil is a triglyceride of various fatty acids and about 10% of glycerine. The fatty acids consist of approximately 80-90% ricinoleic acid, 3-6% linoleic acid, 2-4% oleic acid and 1-5% saturated fatty acids. The ricinoleic acid is an unsaturated fatty acid with a hydroxyl function at the carbon atom 12 which is the main responsible for the extremely high viscosity of castor oil. As opposed to other vegetable oils it is also characterized by its solubility in alcohol and high hygroscopicity.
In this work, crude castor oil obtained from a small Brazilian producer was characterized in terms of some physical and chemical parameters that influence the transesterification process and also the quality of the final product. For example, it was observed that this raw material has an iodine value of 75 g I_2/100g and an oxidation stability higher than 32 h allowing to obtain a biodiesel within the European specifications in what concern these parameters. In terms of acidity, the observed value (1.5 % m/m) showed that basic catalysis could be used for transesterification of castor oil. The influence of temperature, catalyst amount and type, alcohol to oil molar ratio and reaction time in the catalytic process was evaluated. Temperature and reaction time showed to have a significant effect on the transesterification yield. The use of potassium hydroxide as catalyst seemed to be more suitable than sodium hydroxide since the latter led to a decrease of methyl or ethyl esters probably due to its high hygroscopicity. The reactions were also carried out with degummed castor oil being the results obtained better than the ones observed when using crude castor oil.
The transesterification reactions of castor oil were performed in the presence of methanol or ethanol, being the castor oil/alcohol solubility a disadvantage in terms of biofuel/glycerine phase separation, namely when ethanol was used.
The ester content in the final products was determined by gas chromatography (EN 14103) and by RMN [1]. Higher values were observed with the latter suggesting that the chromatographic method preconized in the European standard to quantify esters from vegetable oils such as rapeseed, sunflower or soybean, is not suitable for analysis of esters from castor oil. By RMN, an ester content close to the one required by the EN 14214 was observed using an oil/alcohol molar ratio of 6, 1% of catalyst and 55ºC, for the transesterification process.

[1] L.C. Meher, D. Vidya Sagar, S.N. Naik, Renewable and Sustainable Energy Reviews, 2006, 10 248–268