BIO-SUSTENTABILIDADE E BIO-SEGURANÇA ALIMENTAR, INOVAÇÃO E QUALIDADE ALIMENTAR

23-26 de outubro de 2022

Castelo Branco

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Sociedade Portuguesa de Química

Instituto Politécnico de Castelo Branco

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XVI ENCONTRO DE QUÍMICA DOS ALIMENTOS

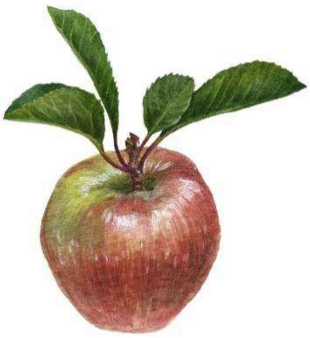
Histórico do "Encontro de Química dos Alimentos (EQA)"

I	1993	Santarém 19-22 de dezembro	Encontro de Química dos Alimentos	Jorge Justino – Instituto Politécnico de Santarém
II	1995	Aveiro 19 a 21 de julho	Encontro de Química dos Alimentos	Ivonne Delgadillo – Universidade de Aveiro
III	1997	Algarve 24-26 de março	Alimentação Mediterrânica	Nídia Braz - Escola Superior Tecnologia do Algarve
IV	1999	Coimbra 1-4 de junho	Qualidade e Inocuidade dos alimentos, segurança alimentar	Maria Irene Silveira - Universidade de Coimbra
V	2001	Porto 8-11 de maio	Qualidade, Segurança e Inovação	Alcina M. M. B. Morais – Universidade Católica
VI	2003	Lisboa 21 a 24 de junho	Novas perspetivas sobre Conservação, Processamento e qualidade de alimentos	Maria Leonor Nunes e Narcisa Maria Bandarra – IPIMAR
VII	2005	Viseu 12 a 15 de abril	Alimentos: tradição e inovação, saúde e segurança	Dulcineia Ferreira – Instituto Politécnico de Viseu
VIII	2007	Beja 4 a7 de março	Alimentos tradicionais, alimentos saudáveis e rastreabilidade	Silvina Ferro Palma – instituto Politécnico de Beja
IX	2009	Angra do Heroísmo 29 abril a 2 maio	Qualidade e a segurança alimentar	Célia C. G. Silva – Universidade dos Açores
X	2011	Braga 3 a 6 de julho	Cem Anos de Química em Portugal	João Paulo André – Universidade do Minho
XI	2012	Bragança 16 a 19 setembro	Qualidade dos alimentos: novos desafios	Joana Amaral – Instituto Politécnico de Bragança
XII	2014	Lisboa 10 a 12 de setembro	Composição Química, Estrutura e Funcionalidade: a ponte entre alimentos novos e tradicionais.	Isabel Sousa e Anabela Raymundo - ISA/ULisboa
XIII	2016	Porto 14 a 16 de setembro	Disponibilidade, valorização e inovação: uma abordagem multidimensional dos alimentos	Beatriz Oliveira, Victor Freitas e Ada Rocha – FFUP e FCNAUP
XIV	2018	Viana do Castelo 6 a 9 de novembro	Indústria, Ciência, Formação e Inovação	M. Rui Alves e Manuela Vaz Velho – Instituto Politécnico de Viana do Castelo
XV	2021	Madeira, Funchal 5 a 8 de setembro	Estratégias para a Excelência, Autenticidade, Segurança e Sustentabilidade Alimentar	José Câmara – Universidade da Madeira
XVI	2022	Castelo Branco 23 a 26 de outubro	Bio-sustentabilidade e Bio-segurança alimentar, Inovação e qualidade alimentar	Ofélia Anjos – Instituto Politécnico de Castelo Branco

XVI ENCONTRO DE QUÍMICA DOS ALIMENTOS

Livro de Resumos

XV Encontro de Química dos Alimentos



Ficha Técnica

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Liquefaction Optimization of Peel of Potato *Solanum tuberosum* L. var Monalisa

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The potato (*Solanum tuberosum* L.) is native to South America, in the Andes Mountains where it was consumed by native populations [1]. According to the Food and Agriculture Organization of the United Nations (FAO), there has been a large increase in potato production in Latin America and Asia, especially China, that in 2018 was the largest producer followed by India. These two countries represented almost a third of the potatoes consumed in the world [1]. In Portugal, the most widely planted potato is *Solanum tuberosum* L. var Monalisa, that is used by potatoes' processing industry, generating tons of potato peel waste annually. The waste from the potato industry accounts for approximately 27% of total production. The objective of this work was to evaluate the potentiality of potato industrial residues to be liquefied by polyhydric alcohols and the chemical transformations observed in this process with subsequent use to produce polyurethane foams.

Potato peel waste (PPW) was dried in an oven, crushed in the Retsch SMI mill and sifted in a vibratory sieve model Retsh 5657 HAAN 1 for 30 minutes. The fractions obtained were > 35 mesh, 35-40 mesh (0.500-0.425 mm); 40-60 mesh (0.425-0.250 mm); 60-80 mesh (0.250-0.180 mm) and 80 mesh (< 0.180 mm). The liquefactions were made in an oil-heated double-shirt reactor with a mixture of glycerol and ethylene glycol 1:1, catalyzed by 3% sulfuric acid. The effect of particle size (<80 mesh at >35 mesh) temperatures (140 °C - 180 °C), ratio material/solvent (1:5, 1:7, 1:10, 1:12) and times (15-60 min) were studied. The Fourier Transform Infrared Spectroscopy by Attenuated total reflection (FTIR-ATR) was used to evaluate the functional groups present in the original sample of PPW, in the liquefied sample and in the solid residue obtained.

Liquefaction percentage with increased temperature, time, material/solvent ratio and granulometry is presented (**Figure 1**). Results show that liquefaction performed at 180 °C with a 1:10 material/solvent ratio, increases along time, reaching a maximum at 60 min. Similarly, liquefactions made during 60 min with a 1:10 material/solvent ratio show that there is an increase in liquefaction yield with the increase in temperature until 180 °C.

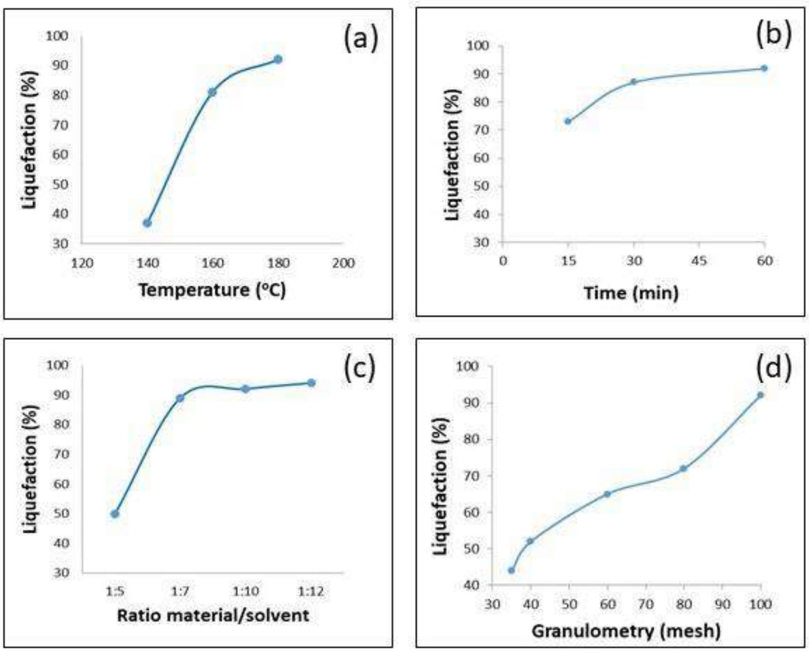

Figure 1: Liquefaction percentage with increased temperature (a), time (b), material/solvent ratio (c) and granulometry (d).

A higher temperature could increase the liquefaction yield but would lead to a higher energy consumption in the process. There seems to be no significative advantage in increasing material/solvent ratio above 1:7, although the liquefaction yield increases for higher ratios. Granulometry testing shows that the smaller the particle the best is the liquefaction percentage. It was concluded that the best liquefaction yield, of approximately 90%, was obtained with a temperature of 180 ºC, for 60 min and particle size <80 mesh for PPW. This material has good properties to be converted in a liquid mixture that can be used later, on the production of polyurethane foams (**Figure 1**).

The PPW spectrum exhibits the common bands for agricultural materials (**Figure 2**). The main differences between the solid material and the liquefied material is the high OH band with a peak at around 3300 cm^{-1} for both the original material and the liquefied, while the peak for the solid residue is at higher wavenumbers. The liquefied sample has a considerable higher OH peak than the solid samples, which is probably due to the polyalcohols used for the liquefaction. The band at 1740 cm^{-1} (non-conjugated C=O bonds) is higher in the solid residue spectrum and smaller in the liquefied material. Similarly Jin et al. [2] observed the absence of C=O groups after the liquefaction of enzymatic hydrolysis lignin. The highest peak in the original and in the liquefied material spectra is the peak at 1100 cm^{-1} which has been attributed to C–O stretching vibrations in carbohydrates. This is in accordance with several chemical compositions reported for PPW [1]. In the liquefied material a new peak appears at around 860 cm^{-1}, which can be due to stretching in the pyranose ring as stated before [3].

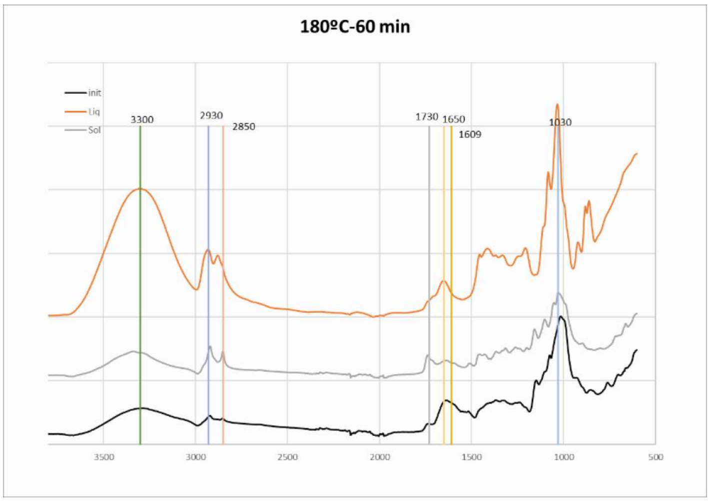

Figure 2: FTIR_ATR spectra of initial PPW, liquefied material and solid residue.

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References:

1. Rodrigues NHP. Embalagem de espuma à base de amido desenvolvida a partir de subproduto da industrialização da batata (Solanum tuberosum L.). *Starch-based foam packaging developed from a by-product of potato industrialization (Solanum tuberosum L).* Published online May 25, **2020**. Accessed June 8, 2022. http://repositorio.utfpr.edu.br:8080/jspui/handle/1/5115.
2.Jin Y, Ruan X, Cheng X, Lü Q. Liquefaction of lignin by polyethyleneglycol and glycerol. *Bioresource Technology*. **2011**;102(3):3581-3583. doi:10.1016/j.biortech.2010.10.050.
3.Domingos I, Ferreira J, Cruz-Lopes LP, Esteves B. Liquefaction and chemical composition of walnut shells. *Open Agriculture*. **2022**;7(1):249-256. doi:10.1515/opag-2022-0072.