

Olive oil waste used to produce molecules with myriad uses in chemical and food industries

July 15 2016

A team of researchers from the Department of Chemical Engineering at the University of Granada has successfully used various olive industry waste products to produce surface active agents. More specifically, they have produced biosurfactants and monoglycerides, molecules which have innumerable applications in the chemical and food industries.

It also marks the first time that alpeorujo has been used in the production of biosurfactants, which are environmentally safe molecules of biological origin with numerous applications in diverse fields such as cosmetics, medicine, food, the detergent industry and the environment.

Surfactants (a portmanteau of surface, active and agent) are molecules that contain an oil soluble component and another water soluble component (polar solvents). The partial solubility in water as well as oil allows the surfactant to fill the interface between oil and water.

Surfactants thus reduce surface and [interfacial tension](#) between individual molecules at the surface and interface, respectively, and also have emulsifying properties.

Alpeorujo is the waste generated during olive oil extraction through the two-phase process (the most commonly used in Spain today). While the implementation of the system has notably addressed environmental problems associated with olive oil production, when unifying and reducing residual currents alpeorujo still poses a severe environmental

and management problem in olive-producing regions due to the pollution it causes and the high volumes which are generated.

Used cooking oils, for their part, are also generated in high quantities in homes, hotels and restaurants. Although there are authorized companies in charge of collecting these used oils, and the collection rate is increasing, it is difficult to find a secondary use for these pollutant products.

Currently, both forms of waste are used for energy production, whether through direct combustion (as with alpeorujo) or through prior conversion into biofuel (used oils). Accordingly, the UGR research group has proposed converting them into substances with great added value, such as those mentioned above.

Furthermore, biotechnological processes have been used for this conversion. In order to fully exploit the alpeorujo, it was fermented with biosurfactant-producing microorganisms. Working in collaboration with another group of scientists from the University of Ulster in Northern Ireland and the Regional University of Blumenau (Brazil), the researchers were able to produce these types of substances for the first time using strains of *Bacillus subtilis* and *Pseudomonas aeruginosa*, with alpeorujo acting as the sole source of carbon.

The findings represent an important breakthrough in obtaining these biosurfactants at lower prices than currently available. On the other hand, for the conversion of [oil](#) waste into monoglycerides and diglycerides, the researchers employed enzymatic hydrolysis, which allows for very smooth reaction conditions. This process was carried out in micro-emulsion, a nanostructured system and with an elevated interfacial area, making it possible to maximize the action of the enzymes.

More information: Ignacio Moya Ramírez et al. Hydrolysis of olive mill waste to enhance rhamnolipids and surfactin production, *Bioresource Technology* (2016). [DOI: 10.1016/j.biortech.2016.01.016](https://doi.org/10.1016/j.biortech.2016.01.016)

Provided by University of Granada

Citation: Olive oil waste used to produce molecules with myriad uses in chemical and food industries (2016, July 15) retrieved 28 April 2024 from <https://phys.org/news/2016-07-olive-oil-molecules-myriad-chemical.html>

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