



# Hydrolates: a review on their volatiles composition, biological properties and potential uses

Cláudia S. Tavares · José A. Gameiro · Luísa B. Roseiro ·  
A. Cristina Figueiredo



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**Abstract** An hydrolate (also known as hydrosol, floral water, aromatic water, or herbal water) is a distillate which is a product of condensation obtained after an essential oil distillation isolation procedure. Hydrolates are colloidal suspensions composed of a continuous phase, the distilled water, and a dispersed phase, the emulsion of essential oil droplets and water-soluble components, namely oxygen-containing compounds. The movement towards a circular economy, has increased the interest in the essential oil industry co-products, such as hydrolates. Hydrolates composition were mostly studied based on their volatile

constituents. Moreover, they showed a diverse range of biological properties, with potential application in food, beverages, cosmetic and pharmaceutical industries, as well as in the agroforest sector. Nevertheless, the information is fragmented and dispersed under the different hydrolates designations. In the present review, the main volatile components of 362 hydrolates obtained from 194 species from 50 families is described, and the information on the corresponding essential oil main components is detailed. Additionally, the methodologies of extraction and analysis are surveyed, as well as hydrolates characteristics and traditional uses. This review also describes the different biological properties attributed to hydrolates and, according with these properties, their potential uses.

**Keywords** Hydrosol · Aromatic water · Chemical composition · Volatiles · Biological activity

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C. S. Tavares · A. C. Figueiredo (✉)  
Centro de Estudos do Ambiente e do Mar (CESAM  
Lisboa), Faculdade de Ciências da Universidade de  
Lisboa (FCUL), Centro de Biotecnologia Vegetal (CBV),  
Departamento de Biologia Vegetal (DBV), C2, Campo  
Grande, 1749-016 Lisboa, Portugal  
e-mail: acsf@fc.ul.pt

C. S. Tavares  
e-mail: claudiasstavares@gmail.com

C. S. Tavares · L. B. Roseiro  
Unidade de Bioenergia e Biorrefinarias LNEG,  
Laboratório Nacional de Energia e Geologia, Estrada do  
Paço do Lumiar, 22, 1649-038 Lisboa, Portugal  
e-mail: luisa.roseiro@lneg.pt

C. S. Tavares · J. A. Gameiro  
SILVAPOR-Ambiente & Inovação Lda. Quinta da  
Devesa, Senhora da Graça, 6060-191 Idanha-a-Nova,  
Portugal  
e-mail: silvapor@silvapor.pt

## Introduction

An hydrolate (H) is internationally defined as the distilled aromatic water that remains after hydro- or steam-distillation and separation of the essential oil (EO) (ISO 9235:2013). Also known as floral water and as hydrosol, it is important to distinguish an hydrolate, which is a distillate, that is, a product of condensation obtained after distillation of the plant material, from an