

TASK 1. SOLUTION

Case study 1.1 Wastewater treatment

Goal

This research aims to assess the environmental sustainability of three alternatives for greywater treatment, photocatalysis, photovoltaic solar-driven photocatalysis, and MBR. It provides an appropriate framework to evaluate the opportunities for process success leading also to the identification of hot-spots, which are the stages with the highest environmental impact.

Function

The purpose of the system is to treat greywater with high degree of removal of SDBS, allowing its reuse for toilet flushing and garden irrigation. SDBS has been selected as target pollutant due to its environmental persistence and because the treatment is applied to hotel laundry greywater, where SDBS is a key component.

Functional unit

Thus, the functional unit is defined on the basis of the same treated volume of greywater and the same amount of SDBS removed. In order to establish the amount of SDBS removed, a minimum threshold accomplished by the three scenarios within a given treatment time has to be selected (Muñoz et al., 2005). Therefore, 1.00 m³ of treated greywater with 90.0% reduction of the SDBS initial concentration is designated as functional unit. All the mass and energy inputs and outputs will be referred to this unit. The use of a similar functional unit that considers the same treated water volume and a fixed reduction level of the contaminant has been previously reported in literature. For instance, Muñoz et al. (2005) defined as functional unit the removal of 15.0% DOC from 1.00 m³ kraft pulp mill wastewater, and Serra et al. (2011) selected as functional unit the removal of 93.0% total organic carbon in 250 mL of wastewater with 500 mg L⁻¹ of α -methyl-phenylglycine.

For more information you can check the paper:

- Dominguez, S., Laso, J., Margallo, M., Aldaco, R., Rivero, M.J., Irabien, A., Ortiz, I. 2018. LCA of greywater management within a water circular economy restorative thinking framework. *Science of the Total Environment*, 621, 1047-1056.

Case study 1.2 Partial Dealcoholisation of wines

Goal

The goal of this research is to quantify the environmental benefits and drawbacks of EP process for wine dealcoholisation. In addition, this technology was compared to other conventional dealcoholisation processes: RO and SCC.

Function

The function of this system is wine dealcoholisation.

Functional unit

The amount of dealcoholised wine is a good descriptor of the process. For that reason, the selected functional unit (FU) was one cubic metre of dealcoholised wine (13.26% v/v).

For more information you can check the paper:

- Margallo, M., Aldaco, R., Barceló, A., Diban, N. Ortiz, I., Irabien, A., 2015. Life cycle assessment of technologies for partial dealcoholisation of wines. *Sustainable production and consumption*, 2, 29-39.