

MILD EXTRACTION OF ONION OIL

Recovering essential oil from onion waste stream with green solvents

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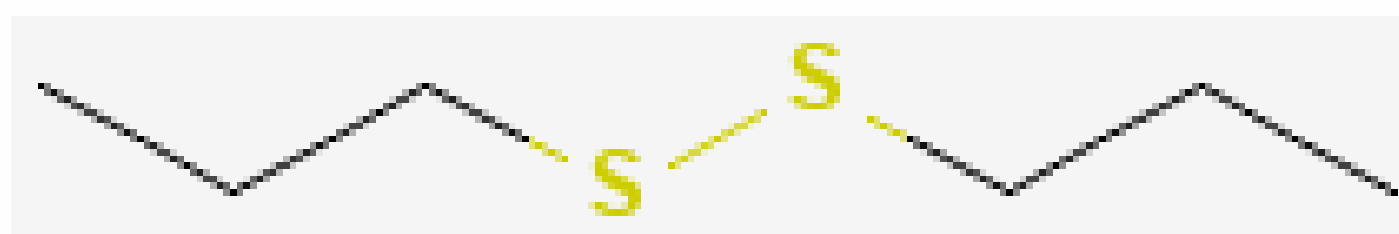
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Introduction

During the industrial processing of onions, large quantities of onion waste stream are generated. While they can be turned into biogas, there is untapped potential to utilize them as a source of essential oil.

The key chemicals in the onion oil are the sulphur compounds, who give the characteristic smell of the vegetable. Their extraction usually occurs

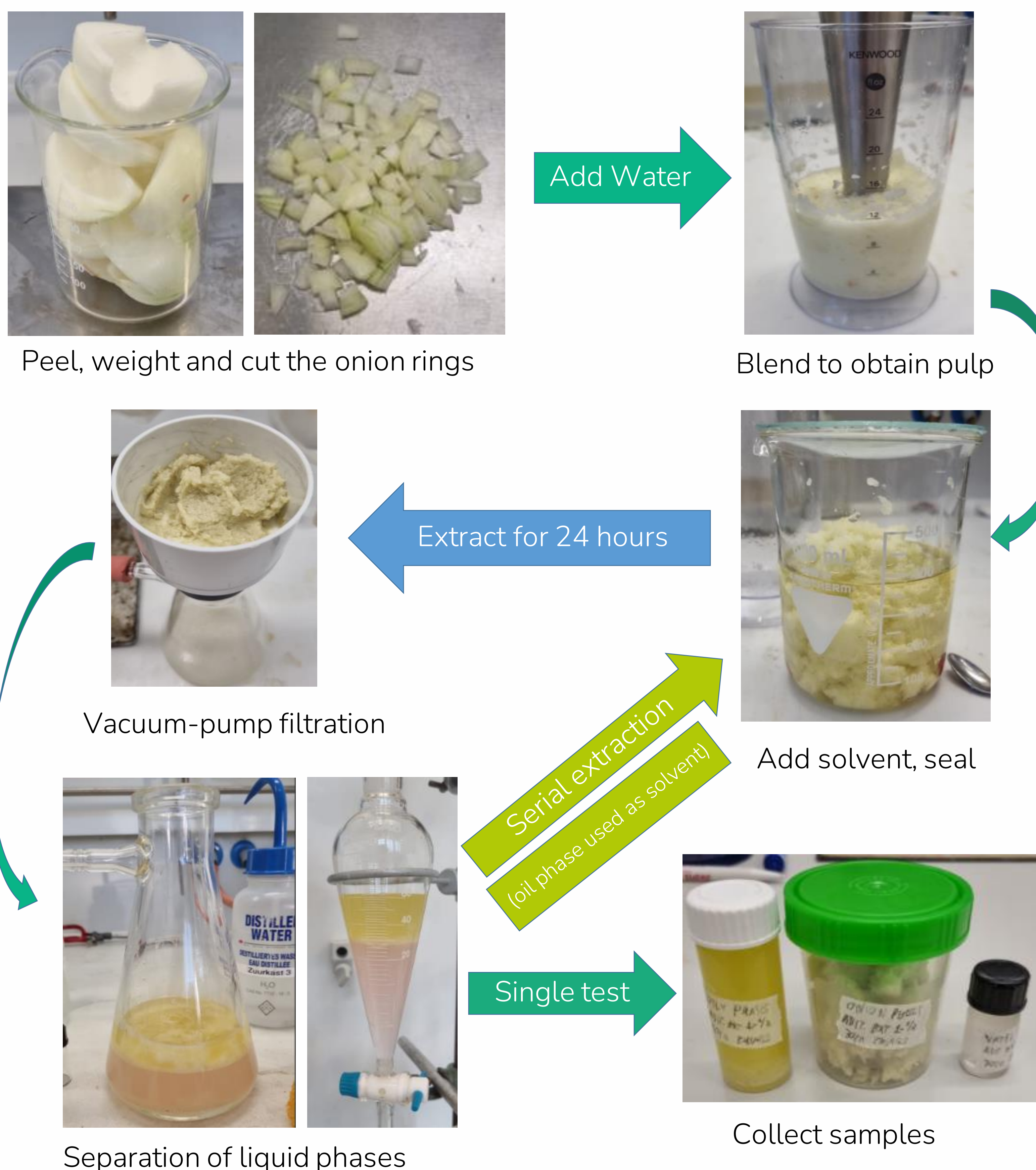


distillation, but the high temperatures denatures the plant proteins, lowering their economic value. By using solvents to extract the oil compounds, it is possible to keep temperatures low and proteins intact.

Goal of Research

- Develop a method to extract essential oil from onion waste stream at low temperatures.
- Determine the best viable solvent to do so.

Methodology



Development of Research

To develop a methodology, it is crucial to identify which parameters of the experiments have the greatest impact on the expected result. Some of the different conditions analyzed were the type of solvent, the quantity of onions, the mass ratio between onions and solvent, the stirring frequency, temperature and extraction power (with the use of serial extractions).



Two distinct experiments before filtering stage. Sharp contrast in visual aspect.

Empirical observations and mass-balance calculations were used to improve and refine the methodology. The quality of the pulp and quantity of onions used were the most important parameters to ensure a good extraction result.

Conclusion and Further Resesearch

- The limiting factor in an extraction is the amount of material being used in the pulp. The minimal amount that allows an extraction is 50g of onions.
- Serial extractions are helpful to determine more advanced factors in the research, but in order to yield enough solvent for the subsequent tests, the mass of onion used in the beginning needs to be high.
- Temperature and stirring frequency are not crucial to the result, however it is necessary to ensure that the proteins are not destroyed and that the mixture is homogeneous as the extraction happens
- The definition of the solvent only can be done after more tests. Olive oil is cheaper than triolein, but the extraction capability needs to be quantified and further LCA and cost-analysis tests are necessary.
- The extraction may happen in the same way with a 50 or 75% reduction on the period of extraction.

References

1. Benítez, V., et al. (2011). Characterization of industrial onion wastes (*Allium cepa* L.): dietary fibre and bioactive compounds. *Plant foods for human nutrition*, 66, 48-57.
2. Images available in: pubchem.ncbi.nlm.nih.gov