

## Supercritical CO2 extraction technique



Picture by Gabriel Ducos

### Keywords

Resin industry

☐ Supercritical CO2 extraction

Rosin

Turpentine oil

resin derivatives

resinous forests

### NWFP

Resins

### Scale

Global

### Context

The traditional distillation of the resin is hydrodistillation or distillation by steam distillation. The resin is mixed with water. The mixture is heated to reach the boiling temperature of the water. The essential oil, a highly volatile compound, is carried by water vapour, unlike rosin. As it passes through the condenser, the mixture (water and turpentine oil) is cooled and returned to a liquid state. Two phases are then distinguished: water and turpentine oil, which can, therefore, be recovered.

### Objective

After harvesting, the resin takes the form of a homogeneous mixture. Its distillation makes it possible to obtain two products: rosin and turpentine oil. The objective of extraction is to isolate and sample these compounds accurately. In other words, it is a question of having the finest possible selectivity. The second objective is not to alter the molecules and thus take full advantage of its qualities.

### Results

The supercritical state of an element is achieved by increasing temperature and pressure. The fluid has physical properties intermediate between those of liquids and gases. For example, the density remains high but the viscosity is low. As a result, the fluid has a very good impregnation capacity. CO2 is used because its supercritical state is reached at relatively low temperatures and pressures (between 40 and 60°C and more than 80 bar). During extraction, supercritical CO2 is injected through the material into the extractor. The result is a mixture of supercritical CO2 with the extract. The separation with the extract is done in the separator, reducing the pressure.



## Recommendations

The main advantage of supercritical CO<sub>2</sub> extraction is that the process does not require a high temperature. However, heat can have a negative impact on the extract. The risk of altering the properties of the extract is therefore reduced with this extraction method. Then, this extraction method could offer a very good selectivity of the molecules or compounds to be extracted by varying the temperature and pressure. Finally, supercritical CO<sub>2</sub> extraction does not require the use of a solvent.



## Impacts and weaknesses

During supercritical CO<sub>2</sub> extraction, the fluid is brought to the supercritical state before being injected into the extractor. However, installations to work under pressure require significant investments and generate additional costs compared to conventional distillation. The use of supercritical CO<sub>2</sub> extraction is therefore only justified for sectors that require a high quality of the extract. This is the case, for example, in the perfumery sector. On the other hand, operating costs are lower than for distillation. To date, many actors can be called upon to provide services, whether on a laboratory or industrial scale.



## Future developments

Supercritical CO<sub>2</sub> distillation tests on the resin will compare the chemical properties of turpentine oil compared to conventional distillation and see if the added value justifies the use of this method. It will then be necessary to identify which markets can be targeted, i.e. those that require superior molecule qualities. Finally, customer and industrial expectations are increasingly oriented towards the use of solvent-free extracts. Supercritical CO<sub>2</sub> extraction is part of the range of operational tools that can meet this demand.

### Further information

<http://www.portail-fluides-supercritiques.com/>

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### About INCREDIBLE Project

INCREDIBLE project aims to show how Non-Wood Forest Products (NWFP) can play an important role in supporting sustainable forest management and rural development, by creating networks to share and exchange knowledge and expertise. 'Innovation Networks of Cork, Resins and Edibles in the Mediterranean basin' (INCREDIBLE) promotes cross-sectoral collaboration and innovation to highlight the value and potential of NWFPs in the region.



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