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Super Critical Fluid Extraction

Skill Course



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Raw materials for SCFE

Sample preparation

Calculation of percentage yield of desired product



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Factors to take into consideration for solid sample preparation:

- **Particle size**
- **Shape**
- **Porosity of the solid material**

These have direct effects on the mass transfer rate of the extraction process.

In order to increase the extraction rate, the solid matrix must be comminuted to increase the mass transfer area.

Too small particles must be avoided as they can compact the bed. This will decrease the extraction rate.



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Dispersing agents (e.g. diatomaceous earth) together with hydromatrix are used with samples of high water content to avoid sample clogging and absorb the liquid portion from the sample.

Drying of the raw material is recommended;

In some cases the presence of water is necessary to favor the interaction of the solvent with the solute.

For example, in the extraction of caffeine from green coffee beans.

It also has a role in the swelling of the cell, which facilitates the flow of the solvent into the cell.



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Liquid sample preparation:

In the case of liquid samples two main strategies are used

- **Trapping the liquid on a solid support (e.g. sepiolite) and to treat it like a solid**
 - This strategy is mainly used at a small scale since the employment of solid supports can increase the extraction costs.

- **Performing column countercurrent extractions**
 - In countercurrent extraction, the liquid sample is continuously added on a column by the top or the middle point, while the supercritical phase is supplied by the bottom point.
 - This strategy has been very useful for oil refining.



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Hurtado-Benavides et al. studied the effect of the type, size, and structure of the column packing on the efficiency and performance of the countercurrent system for the SFE of olive oil;

Authors showed that the use of a column packing with high surface area provides similar results to decreasing the mean particle size of a solid raw material.

*A. M. Hurtado-Benavides, F. J. Senñora ´ns, E. Iba ´nñez and G. Reglero,
J. Supercrit. Fluids, 2004, 28, 29.*