

Solid-liquid extraction using butane or other liquefied gas as solvent

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Butane extraction has been performed in 50's. Then, due to the fact there was no industrial equipment this process has been forgotten. Other applications with liquefied gas such as tetrafluoroethane (TFE or R134a) are now available but until today only at laboratory scale.

CELSIUS as manufacturer of industrial equipment developed the technology of solid-liquid extraction using liquefied gas as solvent. A preindustrial pilot has been built for the matrix capacity of 500 litres. This equipment is polyvalent (butane or TFE) designed in accordance with ATEX 94/9/CE and PED 97/23/CE directives and proves that industrial scale-up is possible with recovery of solvent.



Figure 1. 500 litres pilot extractor

Butane is a green solvent. The main advantages are ambient process temperature (10 to 75°C) during extraction and separation (advantageous for thermosensitive or thermooxydable molecules) and the complete inertia vs interest molecules and vs environment. Its non-polar solvation ability can be extended by addition of a co-solvent such as ethanol. Due to the low required pressure during process (2 to 8barg) butane extractor is cheaper to manufacture than supercritical CO₂ extractor and is not limited by size.

For the screening of extraction process to determine optimized parameters (temperature, holding time, co-solvent...) CELSIUS manufactured a laboratory pilot extractor for 1 litre matrix capacity (without solvent recovery).

These two extraction equipment are at the disposal of partners for confidential extraction tests and design of dedicated industrial facilities.