UHPT

Supercritical CO_2 – advantages extracted.

thyssenkrupp's subsidiary Uhde High Pressure Technologies offers a broad spectrum of applications for the food, cosmetics, and pharmaceutical industries. Supercritical CO_2 extraction – does without chemicals entirely. Supercritical CO_2 might sound extremely exotic, but if you take a closer look at this technology, you soon realize what an impact it has on our everyday lives, e. g. natural aromas obtained from spices or herbs, pharmaceutical applications or decaffeinated coffee.

When you’re drinking a cup of decaffeinated coffee, have you ever wondered how they take the caffeine out of the coffee bean?

What is supercritical CO_2 technology?

But who really wants chemicals in their coffee?

Supercritical fluids
are rather interesting substances that are neither liquid nor gas once a certain critical temperature and pressure have been exceeded. In this state they are almost as dense as a liquid, but have a similar viscosity to gas. Supercritical CO_2 offers clear advantages, as it is easily available, inexpensive, non-toxic, non-explosive, not an organic solvent, and ensures gentle treatment of the product at moderate temperatures (<100°C) as well as easy separation of solvent and extract. Uhde High Pressure Technologies (UHPT) is a world leader in plants and processes that use supercritical CO_2 as an extraction agent.

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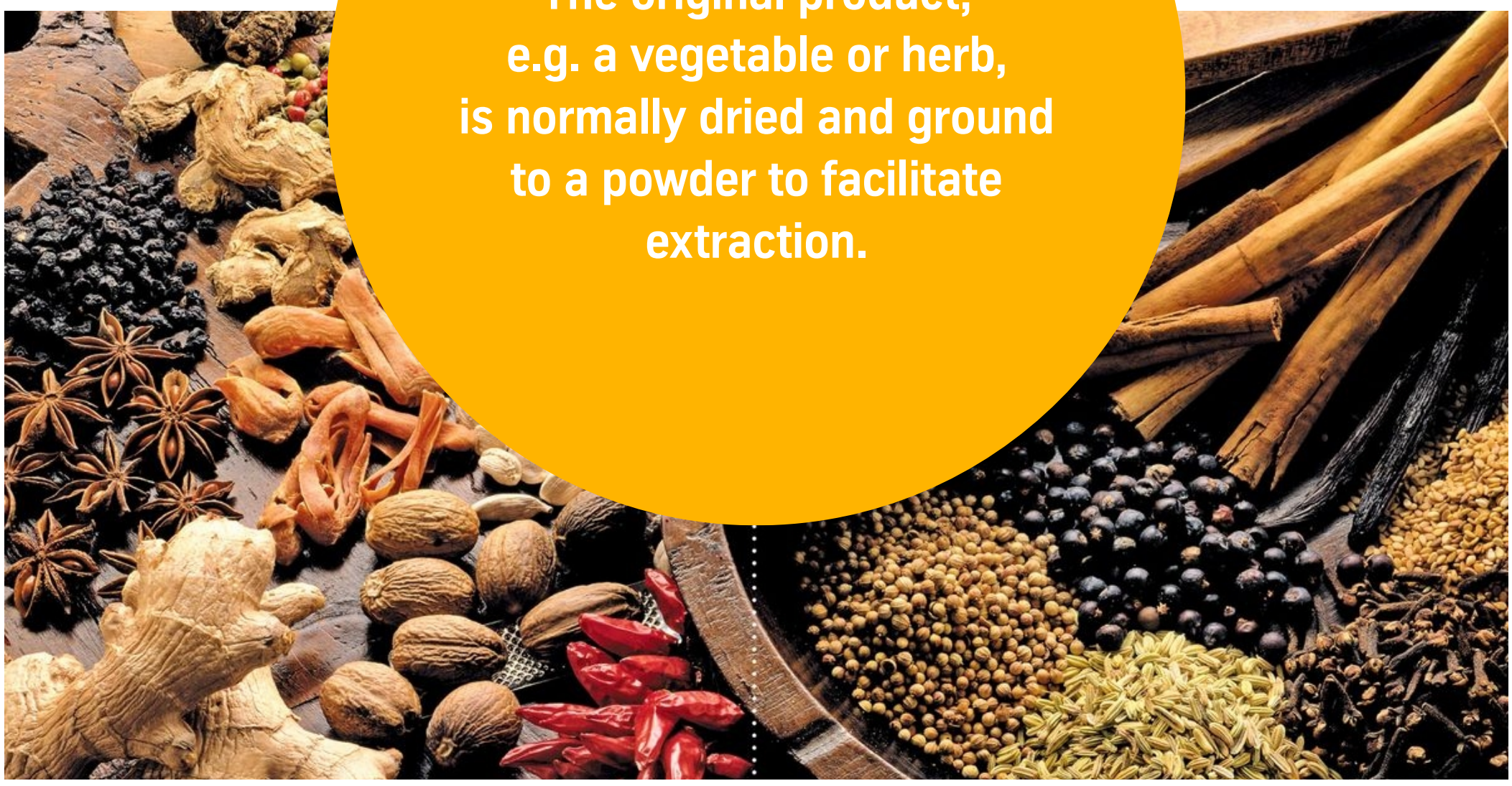
The original product, e.g. a vegetable or herb, is normally dried and ground to a powder to facilitate extraction.



Supercritical extraction
plays a key role in manufacturing high-quality products from natural raw materials, e.g. herbs or spices. The herbs or spices are dried,

ground to a powder, and filled into a product basket, which is then placed in the extractor. CO_2 is fed into the pre-pressurized extractor via a high-pressure pump where it dissolves the extract from the original product. The high pressure improves the solubility of the substances that are to be dissolved. Once this process has been completed, the CO_2 can be recondensed for reuse in the next extraction.

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Extraction
with supercritical fluids has a wide range of practical applications in the food, cosmetics, and pharmaceutical industries, for example. Using this technology to extract natural substances gives us such everyday products as decaffeinated coffee, essential oils, flavors, and color pigments. The pharmaceutical applications are

particularly interesting. With supercritical fluids you can generate or modify micro- or even nano-sized particles with a defined particle size distribution – processes that are making new drugs with exact and controlled properties possible. Aerogels, high-performance insulation materials with exciting new properties, are another high-tech application where supercritical CO_2 acts as a uniquely advantageous drying agent.

When it comes to designing and setting up a supercritical extraction facility, thyssenkrupp can point to a comprehensive service portfolio, including extraction experiments to collect process data, and plant process engineering from lab to production scale. Complete turnkey plants ranging from small compact plants (2–6 liters, 200–1,000 bar) to large production facilities (3–6 m3, 300–750 bar) are supplied pre-mounted in modular form or delivered in parts for on-site assembly.

Extraction technology brings us many everyday benefits. But the engineering know-how needed to efficiently and effectively implement the high-pressure technology of the supercritical processes described here is anything but commonplace. Next time you drink some decaffeinated coffee, you'll know where the heart-friendly taste comes from.

The bottom line: Non-chemical supercritical CO_2 extraction, a technology provided by the thyssenkrupp subsidiary UHPT, has a wide range of applications in the food, cosmetics and pharmaceutical industries. The use of this technology to extract natural substances gives us everyday products such as decaffeinated coffee, essential oils, flavors, and color pigments. thyssenkrupp has extensive expertise and experience in designing supercritical extraction facilities.