UHPT

High-pressure technology relieves stress

Cologne. 7:30 a.m. An espresso maker gurgles in an apartment in Ehrenfeld. A few minutes later Frank (35) pours the black gold into a small cup and serves it to Claudia: “There you go. No milk, no sugar and … for the little one no caffeine." Gently he strokes Claudia’s pregnant belly and laughs.

Munich. Martin (26) gently rubs the oil between his hands and begins the

massage. A fragrance of almonds and lavender enters Marie’s nostrils and she gives a relaxed sigh.

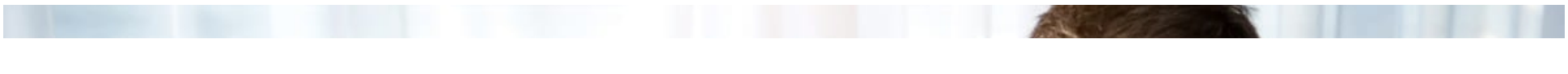
Hamburg. A group of young people sit on the Elbe beach and enjoy the setting sun. Nadja (17) videos herself applying her new rose-red lipstick and sends a kiss to her friends.

Claudia’s coffee, Martin’s massage oil and Nadja’s lipstick have one thing in common: know-how from thyssenkrupp Industrial Solutions. To remove caffeine from coffee, produce fragrances for essential oils and extract pigments from natural substances, a special process is used that works with so-called supercritical carbon dioxide (scCO_2). The science fiction-sounding technology uses no chemical additives and is completely natural.

There are three classic states of matter - solid, liquid and gas. But what if a substance has the properties of both a liquid and a gas? That’s the case with supercritical CO_2. When normal carbon dioxide is subjected to extremely high pressure, up to 1,000 times higher than in our atmosphere, it enters a supercritical state and becomes a supercritical fluid. In this state it is as dense as a liquid but behaves like a gas. And because the molecules in it have very high density and are at the same time highly mobile, they can dissolve other substances extremely well - caffeine, for example. Under high pressure the supercritical CO_2 penetrates the coffee bean and simply washes out the caffeine, leaving the flavor compounds that give the coffee its special taste intact. While conventional solvents are often toxic or have other environmentally harmful side effects, supercritical CO_2 is a clean and effective substitute. You could say that, contrary to what its name suggests, supercritical CO_2 is a “non-critical” and therefore ideal solvent, especially when it comes to gently extracting food substances. And because the extraction process used by thyssenkrupp Industrial Solutions works at temperatures below 100 degrees Celsius, the raw materials and extracts are subjected to minimal thermal stresses. A further advantage is that CO_2 is a natural component of air and therefore available in virtually unlimited quantities. This makes extraction by means of scCO_2 comparatively inexpensive.

Sustainable process

In order to extract flavoring agents using thyssenkrupp Industrial Solutions’ high-pressure technology, the starting material, a cinnamon stick for example, is dried, ground and placed in a pressure chamber. The supercritical carbon dioxide flows through the chamber and releases the flavor from the cinnamon. The CO_2 can then be reused, so this is a sustainable process that doesn’t produce any problematic waste. With this high-pressure technology, not only can natural flavorings and pigments be obtained and coffee or tea decaffeinated, but pesticides can also be removed from plant raw materials - gently and without damaging the material. Another field of application is in the pharmaceutical industry, where supercritical fluids can be used to produce substances in even more precise doses in the micro to nano range - ideal for personalized medicines. For more information go to: https://www.thyssenkrupp-industrial-solutions.com/supercritical-fluids/en



The bottom line: Claudia’s coffee, Martin’s soothing massage oil and Nadja’s rose-red lipstick … supercritical CO2 and high-pressure technology from thyssenkrupp Industrial Solutions are behind the gentle treatment of coffee beans, herbs and plants as raw materials.