# New Separation Technology With Carbon Dioxide Is Cleaner And Cheaper

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Researchers of Wageningen University and Research Centre in the Netherlands have developed a new clean, process to isolate valuable or undesired components from solids, such as components for food products. In contrast to other conventional processes, the new invention concerns a continuous process that can be controlled easily and secondly, leads to higher extraction yields.

Many odours and flavours are extracted from plant tissues by dissolving in organic solvents, such as hexane and alcohols. Subsequently, the solvent is evaporated after which the target components remain as pure product. From an environmental point of view and regarding food safety, the use of organic solvents is not always desired.

In the new process, which is developed in the framework of an European Union project C-REX, carbon dioxide is used as a solvent. In this process the carbon dioxide is compressed extensively, which gives it properties that are comparable to both solid and liquid, i.e. the so-called supercritical phase. The application of compressed carbon dioxide instead of organic solvents results in a cleaner extraction process. Carbon dioxide is a gas that is abundantly available in the atmosphere.

Some industries already apply compressed carbon dioxide to remove, for example, caffeine out of coffee or to extract flavours from hops for the production of beer. The Dutch researchers of Agrotechnology & Food Innovations, part of Wageningen UR, are the first to make this a continuous process. As a result, the separation process is strongly

simplified. Besides that, in relation to other methods, the yields can be much higher, which leads to lower energy consumption and carbon dioxide loss and also, to reduction of processing costs.

In the new, continuous process an extruder is implemented. This machine, which can be roughly described as two rotating screws in a metal tube, is normally used for mixing and shaping of plastics and food products. The Dutch researchers have adapted the machine in such a way that it can be employed as a high-pressure vessel in which the continuous extraction can take place. The high pressure is maintained by creating two material plugs in the beginning and end of the extruder. In between, the compressed carbon dioxide is added, taking up the desired (or undesired) components. Next, the researchers separate the dissolved product from the carbon dioxide by decreasing the pressure after which the carbon dioxide is re-used and the pure product remains as solid or liquid.

The developed process can also be applied for the purification of materials, such as plastics. Next to that, the new technology can be utilised as a new production route for foams in the plastic and the food industry.

Source: Wageningen University and Research Centre