



ESSENTIAL THERAPEUTICS

Did you know... About CO₂ Extracts

CO₂ (or carbon dioxide) extracts are derived from a unique extraction process known as **supercritical carbon dioxide extraction**.

Generally, carbon dioxide is found only as a gas or as a solid in the form of dry ice. There is no liquid form of carbon dioxide under normal conditions.

However, if we squeeze or condense carbon dioxide under very high pressure, we will first create liquid carbon dioxide, which can be used for extraction purposes. Increase the pressure further (to about 1,711 times normal atmospheric pressure) and increase the temperature to around 30° to 40° C, the carbon dioxide enters the 'supercritical' phase – an unusual state where the carbon dioxide has the properties (or acts like) a gas, yet is as dense as a liquid.

In this supercritical state, carbon dioxide is a very effective solvent for extracting any oily (or lipophilic) compounds from plant material and in certain cases, water-soluble compounds as well (carbon dioxide is used for removing caffeine from coffee beans when a small amount of water is added to the mix).

After the pressure is released at the end of the extraction process, the carbon dioxide simply evaporates, leaving an extremely pure plant extract behind.

There are two types of CO₂ extracts. First, there are **select** extracts, using Frankincense CO₂ extract as an example. In this case, powdered Frankincense resin is extracted for a limited period of time so that the final extract contains 90% + of aromatic compounds, as would be found in the steam distilled essential oil.

The second type are **total** extracts, where the plant material has been extracted for the time it requires to remove all oily, lipophilic compounds, including vegetable oils, waxes, etc. Using Calendula CO₂ extract as an example, the total extract is desired in this case because the most active ingredients (faradiol and its esters – strongly anti-inflammatory & healing) require a longer extraction to remove and would be too heavy to extract using steam distillation.

What are the advantages of carbon dioxide extracts?

- With some plants, the most active compounds are too heavy to be extracted with steam distillation. Carbon dioxide extraction will remove these compounds. Ginger CO₂ extract is a good example. Gingerol and shogaol, the most pungent, warming compounds in Ginger are best extracted with carbon dioxide, not with steam distillation.
- Because the plant material is not exposed to air (oxygen) or heat, as compared to steam distillation, none of the compounds change or oxidise during extraction. Hence, the final extract is just the same as in the plant – the same composition and aroma. In the case of German Chamomile CO₂ extract, matricin is not converted to the dark blue chamazulene, as in the steam distilled oil. In studies, matricin was shown to be 10 times more potent in reducing inflammation than chamazulene. Steam distilled German Chamomile is still quite useful, however. It appears chamazulene may well be more active in cases of allergic skin reactions.
- Carbon dioxide, as compared to using hexane for extraction, fully evaporates from the final extract, leaving an extremely pure extract with no solvent residues.

Highly concentrated like essential oils, these CO₂ extracts can be used at low dilutions in vegetable oils and our other base products to great benefit.