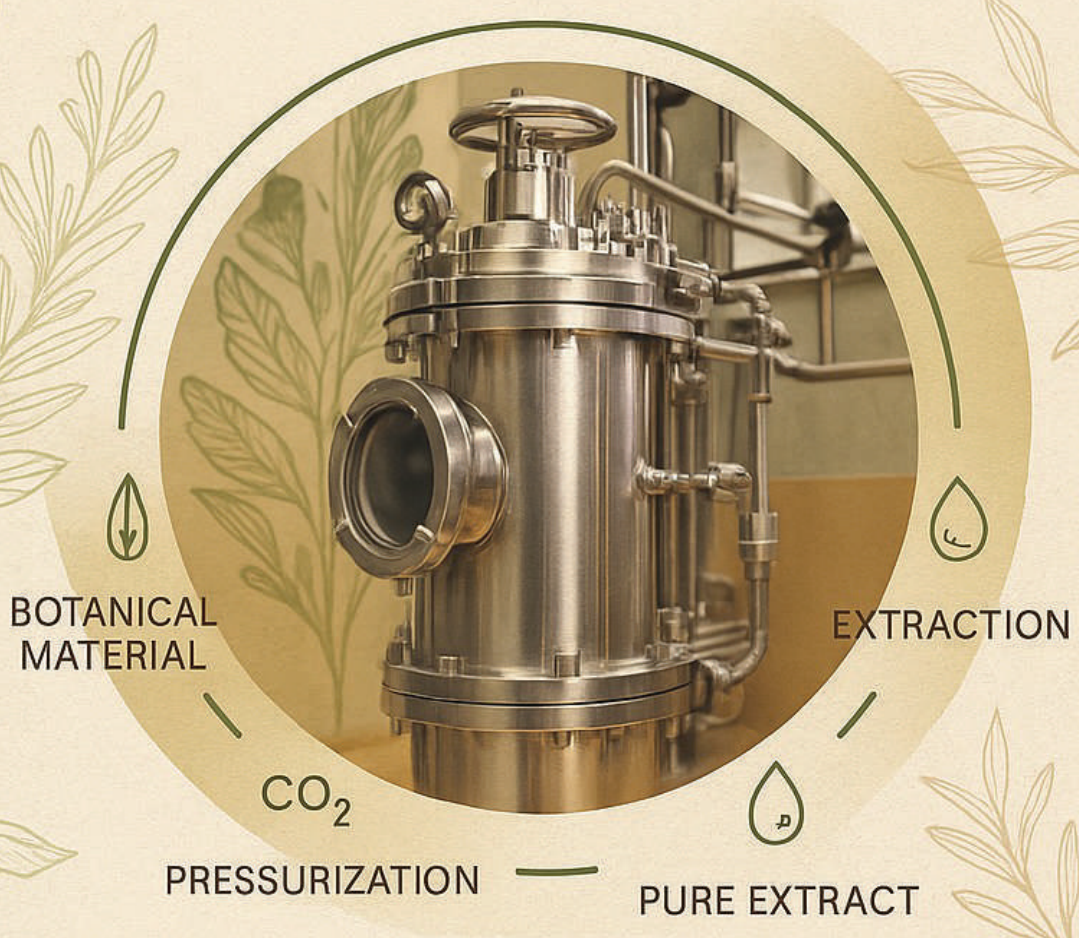
SUPERCRITICAL CO_2 EXTRACTION

THE GREEN TECHNOLOGY BEHIND CHEMICALLY PURE BOTANICAL EXTRACTS



From Nature to Molecule –
Green Innovation by AMEL Extract sh.p.k.

AMEL

**From Nature to Molecule* – powered by SCFE-CO_2 Technology

THE PRINCIPLES OF SUPERCRITICAL CO_2 EXTRACTION

Clean, Efficient, and Environmentally Compliant Technology

What Is Supercritical CO_2 Extraction?

Supercrirical CO_2 extraction is a clean and selective process that uses carbon dioxide under controlled pressure (≠31 °C. ≯ 74 bar). in its supercritical state, CO_2 behaves as both a gas and liquld, penetrating plant material and dissolving target compounds without chemical solvents
Therefore, once the pressure is released, CO_2 reverts to a gasedus state, leaving behind a chemically pure extract-free from residues, toxins, or heavy metals.

Why It Matters

Mild Conditions (31 °C) preserves sensitive molecules → **Selective Solvent Power** extracts desired compounds only → **Zero Residue** CO_2 evaporates completely → **Sustainability** recyclable CO_2 no waste streams

Compliance with EU Green Standards

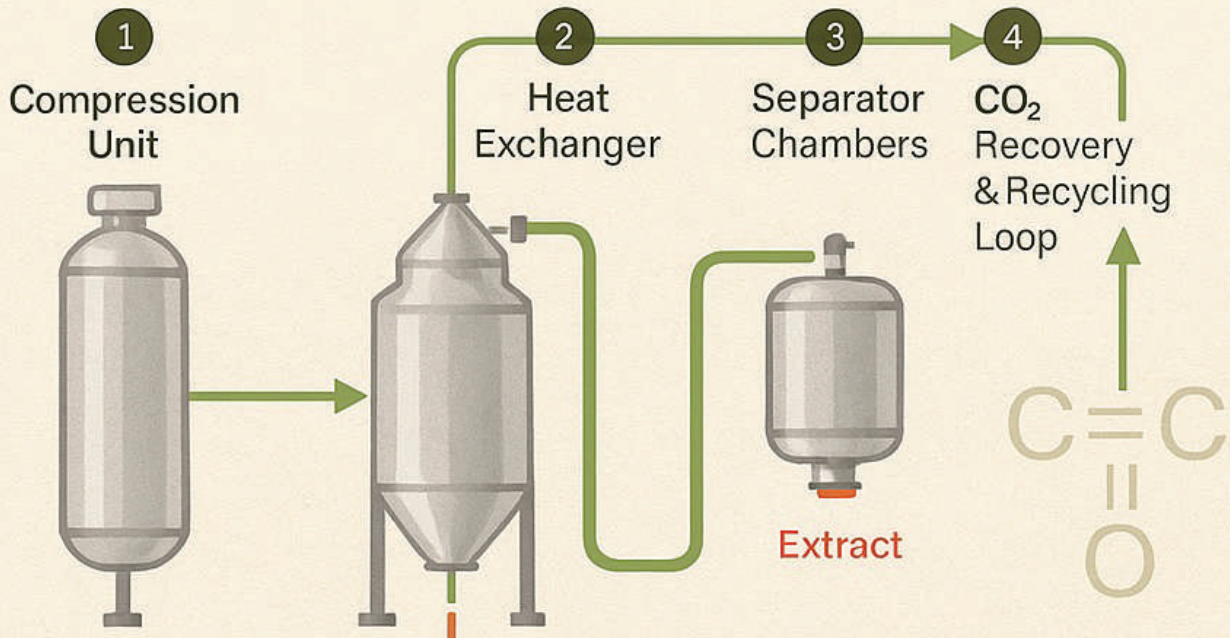
Standar / Directive	Compliance Through SCFE-CO_2
EU Regulation 1223/2009 (Cosmetics)	No solvent residues, traceable botanical origin
EESA / EMA Standards (Food & Nutraceuticals)	Purity & safety confirmed by CO_2 GRAS status
ISO 22000 / GMP	Controlled process validation & hygiene
REACH / RoHS	

Chemical purity · Solvent-free extraction · Eco-friendly process · Preserved bioactivity · Fully recyclable CO_2

AMEL Extract applies the most advanced CO_2 based extraction technology in compliance with EU Green Deal principles — ensuring natural integrity.

Inside the Process – How Supercritical CO_2 Extraction Works

Precision engineering meets green chemistry.



- Closed-loop system no solvent waste
- Scalable and modular adaptable to different plant materials
- Controlled thermodynamics preserve octive compounds
- Fractionation capability to separate aromatic, lipiphilic, and polar fractions

Closed-loop system
no solvent waste

Extraction CO_2
no waste streams

Each step of AMEL Extract's SCFE-CO, system ensures maximum yield, purity, and environmental responsibility — embodying the future

The Three Forms of Botanical Extracts

Purity, Stability, through SCFE-CO_2 Technology

Solid Extract

Concentrated form obtained directly after CO_2 extraction and separation.

High purity, stable at room temperature, rich in active molecules

Applications

Nutraceuticals tablets, dry mises, functional food powders

Diluted Extract

Extract fraction dissolved in natural carrier oils (almond, jojoba, grape seed).

Bioavailable safe for dermal aral oral use

Applications

Skincare serums, aromatherapy oils Nutraceutical drops

Encapsulated Extract

Encapsulation in sodium alginate microspherees, for stabilization of sensitive bioactives,

Controlled release, oxidation protection

Improved absorption

Capsules

Functional foods Cosmeceuticals

Extract Form	Key Property	Advantage	Example
Solid	Pure concentration	High stability	Powder supplements
Diluted (Oil)	Enhanced solubility	Ready for topical/oral use	Cosmetic serums
Encapsulated Extract	Controlled release	Long-term protection	Nutraceutical capsules

SCFE-CO_2 extraction enables molecular flexibility – from solid precision to liquid functionality and encapsulated stability.

CERTIFIED PURITY

Meeting the Highest European and International Standards

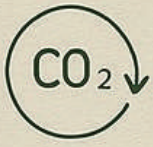
SCFE-CO_2 extraction delivers solvent free, residue-free, and regulation-compliant botanical actives.

CHEMICAL PURITY

Every SCFE-CO_2 extract is obtained without organic solvents,.ensuring **absolute chemical purity,** ensures absolute chemical purity

No solvent residues

100% pure bioactive content

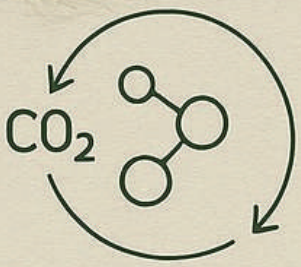


CO_2 recovery loop - zero emissions

REGULATORY FRAMEWORK

Regulation /Standard	Scope
EU 1223/2009 (Cosmetice Regulation)	Ingredient safety & purity
EFSA / EMA Guidelines	Nutraceutunal & food safety, no toxic residue
ISO 22000 / OMP Process quality & hygiene	Controlled temperature & pressure
REACH & RoHS Environmental cafety	Environmental safety Non-toxic process
EU Green Deal 2030 *Gncular cconomy* target	Waste-fice. energy-efficient extraction

ENVIRONMENTAL RESPONSIBILITY



CO_2 is captured, used, and recovered in a continuous closed cycle - ensuring zero atmospheric release and minimal energy footprint.

Chemical purity

Molecular integrity

Circular sustainability

Regulatory compliance

Eco-innovation

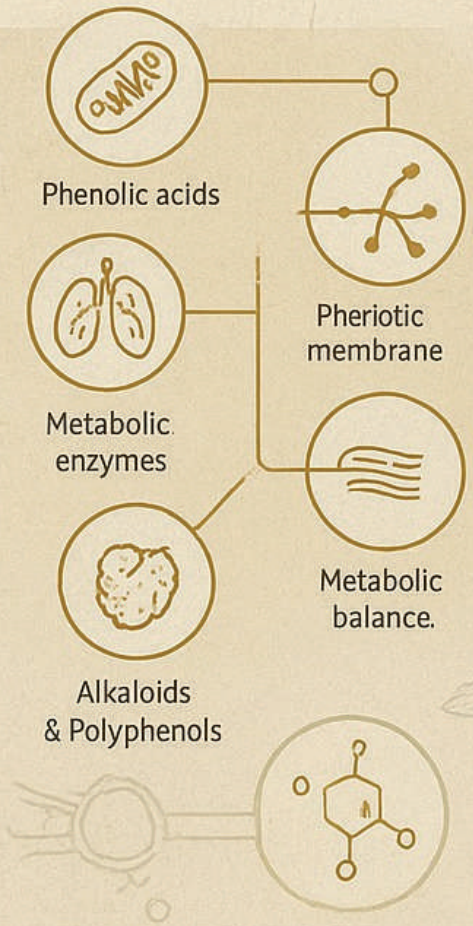
AMEL Éxtract sh.p.k. applies certified CO_3 extraction processes that meet international quality standards - producing pure, safe, and sustainble botansial

The Power of Secondary Metabolites

Nature's molecular language decoded through SCFE extraction.

Plants synthesize thousands of secondary metabolites — complex organic compounds that protect, regenerate, and communicate at the cellular level. Through SCEE-CO_2 extraction, these bioactive molecules are preserved in their purest natural form, retaining full biological potency and chemical integrity.

Metabolite Class	Representative Compounds	Molecular Mechanism
Flavonoids	**Quercetin** Apigenin, Luteolin	Activating NRP2 pathway
Terpenes	Modulate TRP & CB2 receptors	Anti-- inflammatory. neuroprotective
Phenolic acids	Inhibit lipid peroxidation	Cardioprotective UV shielding
Triterpenes Oleanolic. Ursolic acids	Regulate mitochondrial enzymes	Metabolic balance regeneration
Alkaloids & Polyphenols Caffeinc. Theobromine	Stimulate AMPK & CAMP pathways	Energy, alterness lipolysis



Neuropro-tection
CB24TRP channel modulation

Metabolic optimization
AMPK activation

Dermal regeneration
fibcoblast stimulation

Cardio-protection
antoxidght cascade

Cellular longevity

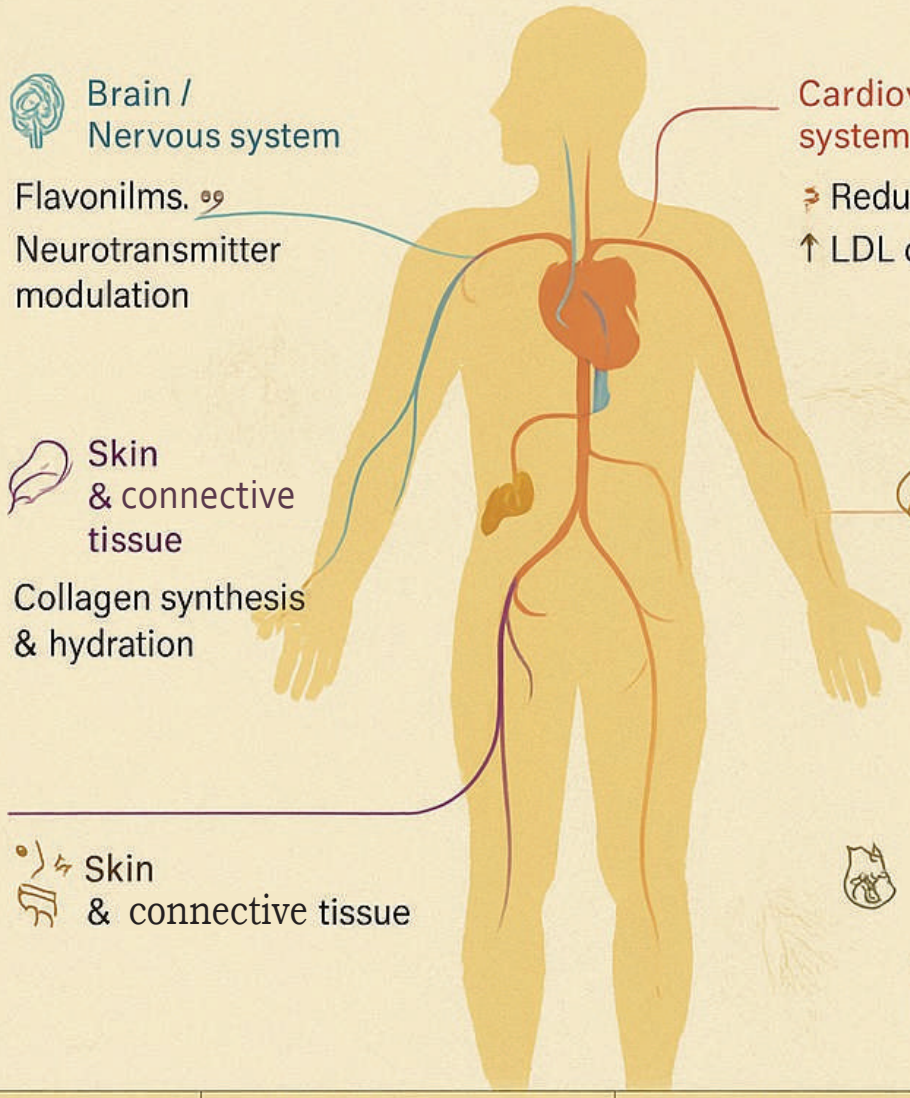
Mitrochondrial repair

Encapsulated stability

Each class of plant metabolites represents a molecular dialogue with human biology — emplified and purified through the SCFE-CO_2 process.

How Botanical Molecules Interact with the Human Body

Molecular pathways that support balance, regeneration, and protection.



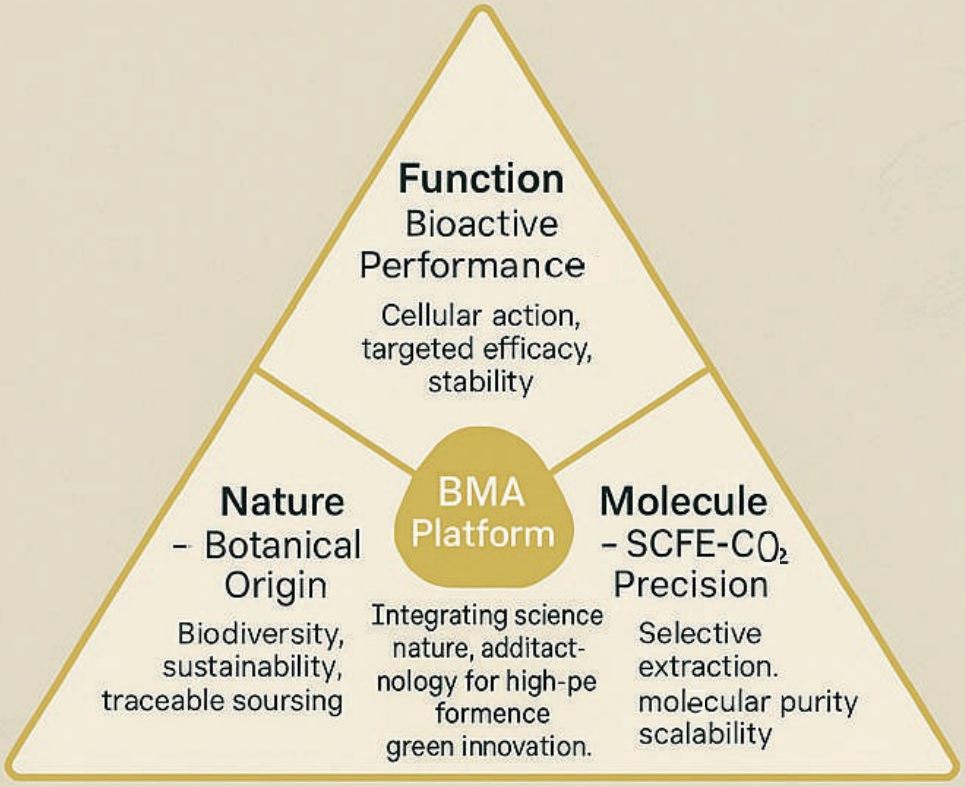
System	Key Compound	Mechanism of Action.	Blological
Nervous	Luteolin B-Coryhohyllene	CB2 receptor modulation CB receptor	Calmness. neuroprotection
Cardiovascular	Oloouropein. Roamininic acid	Inhibits/#PP€/ mTOR pathways	Heart health anti-inflammatory
Muscular / Metabolic	Oleanolic acid Leuzine	Stimulate AMPA / boosts fibreblast ativity	Energy balance. toning
Skin	Squalsne Hydroxytyrosol	Reinforcest jipid layer Boosts fibrablast activity	Regeneration elasticity

The synergy between secondary metabolites and human phystology forms a bio-molecular bridge—restoring balance at cellular level, enhancing metabolism, and protecting tissues damage.

Antioxidant defense **Cell regeneration** **Metabolic balance**

From Extraction to Innovation–
The Botanical Molecular Approach

Where natural science meets industrial performance.



Industrial Application Fields

Industry	Application Examples	Role of SCFE-CO_2 Extracts
Cosmetics & Skincare	Serums, creams, balnts. scalo tonics	Antloxidant, regenerative, protective
Nutraceuticals	Capsules, powders	Anti-inflammatory, evrinsprotective
Pharma / Blotech	Capsules, powders	Energy balance
Food Industry	Food Industry	Functional food

High-purity extracts
consistent & safe formulations

Sustainable process
zero solvent waste

Scalable technology
from lab to industry

Natural efficacy
proven biological functionality

Cross sector applications
multi-industry integration

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