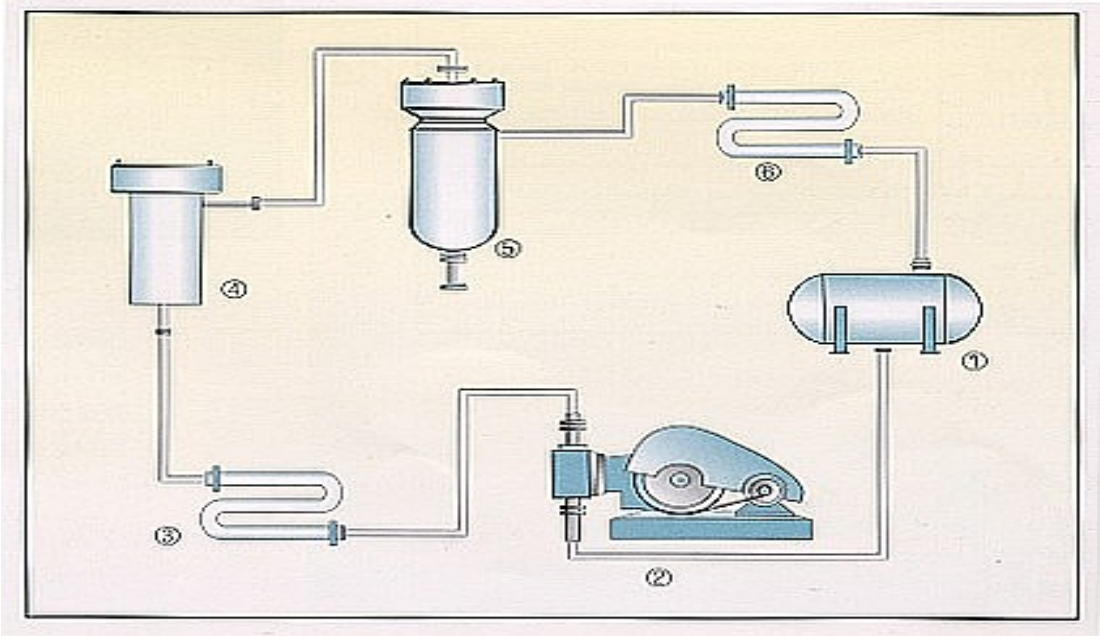
No. 8, YongDa Road, Hongqi, ZhuHai, China
Post Code: 519090 Http://www.sinogt.com
TEL: +86-756-799311 FAX: +86-756-7799572

Brief Introduction of Supercritical CO2 Extraction System

A. Technology Brief Introduction

1. Basic Principles

The Supercritical CO2 extraction system adopts CO2 as solvent to get best extraction and separation effects under super critical condition. This system consist of extract autoclave, separation autoclave, resolve autoclave, storage tank, high-pressure pump and heat exchanger, main flow chart as below:



Firstly, load the material in extract autoclave④，Liquid CO2 from storage tank⑦ goes through the high-pressure pump② and heat exchanger③, heated and pressurized to the required temperature, and then goes into extract autoclave④. The required ingredients are dissolved in CO2 and taken out to separation autoclave⑤，the extract are separated from the CO2 by changing the pressure and temperature (to reduce the solubility)in separation autoclave. The liquid CO2 after separation process goes into the condenser⑥ storage tank⑦ and recycling after liquefaction.

2. Application Range

The Supercritical CO2 extraction technology characterized by innocuity, smelless, incombustible, normal temperature and free from contamination, etc. It can protect the original

color, smell, taste from heat affecting; even more prevent heat sensitive and Oxidizing material from damage; moreover, it can separate and purify the extract during the extraction period, it is widely used in food, medical, chemical, spice and many other industries.

Application	Samples
Functional Oil	Sea backthern oil, wheat germ oil, fish oil, walnut oil, pine nut oil、grape-stone oil, etc.
Traditional Chinese Medicine and Its Extract	Creat lactone, ginkgolides, angelica oil, Rhizoma zxedoariae oil, shiandra oil, semen plantaginis oil, dodder oil, khosam oil, natural caffeine, GreenTea extract, etc. Medicinal materials extracts of magnolia officinalis, turmeric, atractylis, galangal, ledebouriella seseloides, angelica dahurica, ligusticus wallichii franchet, notopterygium root, Salvia miltiorrhiza, ageratum, perilla, cornor, root-bark of tree peony, Rhizoma Zingiberis, costus root, seed of jog's tears, rhizoma cyperi, immature bitter orange, cinnamon, fennel, amomum villosum, etc.
Condiment	Ginger oil, singma and chilli pigment, pricklyash peel oil, pepper oil, etc.
Flavor & Fragrance	Essential oil for flos magnoliae liliflorae, tobacco leaf, rose,etc.

3. Technical Characteristic：

- High active ingredient content, little impurity, steady quality；
- Characteristic odor of raw material from extract；
- Faster extraction time, shorter production period；
- Producing kinds of extract with different purity as per customer’s requirements；
- Low temperature, sterilization and oxidation resistance characteristics of Supercritical CO2 extraction technology makes quality assurance and improvement of the extract;
- Complete evaporation without solvent residue，very low content of heavy metal and pesticide residue.

No. 8, YongDa Road, Hongqi, ZhuHai, China
Post Code: 519090 Http://www.sinogt.com
TEL: +86-756-799311 FAX: +86-756-7799572

4. Technical specification:

- Max. design pressure of extract autoclave:32 MPa,45MPa
- Cryogenic temperature：0℃～10℃
- Heater：Atmospheric temperature～90℃
- Separation pressure：Equal or lesser than 8MPa

5. Key Technology

- Application of new technology
- Technology to form a complete set
- High Pressure equipment
- Composite material
- Fast open seal

B. Equipment Brief Instruction

The supercritical CO2 extraction device designed by our company, adopt advanced technology, such as CO2 main system, refrigeration system, hot water constant temperature system, CO2secondary system , air elimination and clean system and automatic control system etc., which up to the advanced levels in the world.

1. CO2 main system, namely CO2 circulatory system:

In the system, carries on the extract and the separation to the material, this system consists of the high pressure and medium-pressure vessels. The equipments including:

1) Extract autoclave: Used for extraction as main equipment, the full bore fast open structure makes the operation time of cover open /close in 1 minute. A material basket in autoclave is applied for loading and unloading. In the basket, the precise durable filtrating device can prevent the material access in pipe and other equipment.

2) Separation autoclave: It is used in separating material by the system may consist of 1 autoclave or 1 column 1 autoclave or 2 autoclaves, or according to the user request.

3) Heat exchanger: The primary functions of Heat exchanger are:

a) To ensure the temperature of CO2 achieves the extract temperature and separation temperature. b) To ensure the CO2`s liquefaction.

c) To ensure the CO2 can enter in the high-pressured CO2 pump to carry on the circulation, this system has 4 heat exchangers. CO2 high-pressure pump: building up the pressure of CO2 to enable its pressure achieves the extraction pressure, the top pressure limits to 45MPa. The velocity modulation system is equipped for flow control, and it is equipped with level 3 overpressure protective measure.

4) CO2 buffer tank: for liquid CO2.

5) CO2 storage tank: CO2 storage.

2. Refrigeration system:

This device adopts the double refrigeration system, at all request of different operating conditions. The capacity of system can under a more precise control, and running steadier.

3. Hot water constant temperature system:

This installment is equipped with three sets of different hot water constant temperature systems, for easy control of extract and separation temperature (the nos. of temperature system may add according to user's request)

4. Electric instruments control:

The temperature and the pressure value can be controlled automatically and display on the device. High-pressured CO2 flow meter, the high-pressured CO2 liquid level indicator is applied for supervising the system's running condition. All temperature, pressure, capacity and liquid level of the system are recorded and demonstrated by the computer.

5. Safety:

1) The safety valve is set according to the pressure vessel safe supervision stipulation.

2) Addition multistage limiting pressures and stop device to the high-pressure pump, guarantees the safety and reliability.

3) The high-pressure vessel uses the stress analytic method for design.

4) The autoclave has the pressure and the differential pressure automatic monitoring alarm system when it running and uncaps, this can prevent it from damage during the movement process of hanging basket (material basket) cause by the differential pressure inside and outside, and this can also prevent it from accident when uncaps.

6. CO2 secondary system:

1) This installment is equipped with the CO2 recovery system, for recycling CO2 before the extract autoclave opening.

2) Equipped with the initialize the system, it prevents the system parameters fluctuate and make process stable during the replacement of two extract autoclaves.

7. Air elimination and clean system.

1) This installment is equipped with air scavenging system; it can sweep the mix-air cause by loading and discharge materials to ensure the CO2 purity.

2) Equipped with convenient clean system, in order to change product easily.

C. Reference pictures

1, Small Supercritical CO2 Extraction System

No. 8, YongDa Road, Hongqi, ZhuHai, China
Post Code: 519090 Http://www.sinogt.com
TEL: +86-756-799311 FAX: +86-756-7799572

2, Large Supercritical CO2 Extraction System