



Apex technologies co., designed and manufactured a supercritical fluid extraction equipment for different purposes including extraction of essential oils, removal of contaminations from soil (cleaning purposes), and regeneration of spent catalysts and fabrication of sub-micron and nano size pharmaceuticals or any soluble substance in SC-CO₂. Supercritical fluid is any substance at a temperature and pressure above its critical point. Such fluids can diffuse through solids like a gas and dissolve materials like a liquid. Near the critical point, small changes in pressure or temperature result in large changes in density, allowing many properties of a supercritical fluid to be “fine-tuned”. Supercritical fluids are often suitable substitutes for organic solvents in a range of industrial and laboratory processes. Among the different possible solvents, carbon dioxide is one of the most common used supercritical fluids mainly due to its mild critical point (31 °C, 1057 psi).

The current equipment is comprising of one 5 liter extraction vessel. These extraction vessels can be combined with an air driven oil-free reciprocating Haskel pumps coupled with a high pressure compressor for automatic pressurization. In addition, an integrated program logic controller monitors and adjusts fluid pressure inside the extraction vessel to achieve and maintain a desired set point. The carbon dioxide supplied from capsule is liquefied using a refrigeration system with a minimum temperature of -25 °C. The equipment is provided by one high pressure single pump enable the operator to inject different co-solvents using this high pressure pump with minimum flow rate of 0.1 l/h up to pressure of 350 bar. The temperature of all the vessels including extraction vessels is controlled using heating elements coupled with a PT-100 thermocouple. As a safety precaution, safety valves provide mechanical protection against accidental over-pressurization of the system was installed in-line.





✓ **Technical Specification:**

Applicable to investigate the effectiveness of supercritical carbon dioxide on deactivation of spent catalyst or removing any polar or non-polar contaminations
Extraction vessel is equipped with two sight glasses enable the operator to monitor the contents of the vessel
Transfer vessel for co-solvent injection × 1 (volume of transfer vessels: 500 cc made of stainless steel 316)
HP-HT metering valve to control the output flow × 1 (BuTech)
Applicable to extract essential oils from herbs and seeds and etc.
Oil-free air driven reciprocating Haskel/Maximator pump × 1
Maximum working temperature of extraction vessel: 70 °C
Main process valves: BuTech/Autoclave/HIP
Maximum working pressure of extraction vessel: 300 bar
Minimum temperature of refrigeration system: -20 °C
Minimum carbon dioxide discharge pressure: 50 bar
Controlling temperature system × 1: PID control
Connections and plumping: Stainless steel 316
Stainless steel basket to handle the sample
Extraction vessel volume × 1: 5 liters
Heating mechanism: heating jacket
Wetted parts: stainless steel 316
Temperature resolution: 0.2 °C
liquefaction system × 1
Collection vessel: × 1 (1000 cc), × 1 (700 cc)
Collection vessel pressure: 150 bar

Touch panel equipped with a software for expansion algorithm
Valveless expansion system for the first time
Automatic emergency drain valve: Autoclave × 1
High pressure safety valve × 1
Adjusting the temperature of the collectors independent of the temperature of the extraction vessel
Digital pressure sensors with an accuracy of 0.5% of full scale × 3
Expansion nozzles × 2
Metering Valve: HOKE/Autoclave × 1
Compressed air control unit
Compressed air compressor: <ul style="list-style-type: none"> • Maximum operating pressure: 8 bar • Vessel volume: 250 liters Single phase
High pressure pump to inject co-solvents × 1 <ul style="list-style-type: none"> • Pulseless mechanism • Necessary to inject liquids such as alcohols enhance the solubility power of supercritical carbon dioxide for polar compounds • Max. pressure of injection: 300 bar • Wetted parts: stainless steel 316 • Min. flow rate: 0. 1 l/h • Effective volume: 0/5 liter • Max. flow rate: 1 l/h • Piston cylinder type • Compact design Working modes: Constant flow rate and pressure

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