Ingenious Brain

Case Study

How We Guided Our Client's Success by Identifying **Supercritical CO_2 Extraction** Technology for Superior Purity and Sustainability

Objective

A leading client in the chemical industry engaged IeB to assess the technological and commercial landscape of supercritical CO_2 systems, with a focus on applications where biogenic CO_2 substitutes conventional organic solvents. The client also aimed to map the supplier ecosystem for both equipment providers and biogenic CO_2 suppliers, particularly in contexts where solvent disposal and recovery present significant environmental concerns.

Our Strategic Approach

We applied a systematic, research-driven framework to evaluate the potential of supercritical CO_2 as a sustainable solvent alternative. Our work combined technology benchmarking, supplier mapping, and process integration insights to reveal opportunities for innovation in extraction and purification systems.

Technology & Process Assessment

Assessed the current state of supercritical CO_2 extraction technologies across pharmaceuticals, food & beverage, and cannabis industries, with emphasis on applications requiring contaminant-free outputs such as seed oils, herbal extracts, and drug compounds.

Supplier & Ecosystem Mapping

Mapped the competitive universe of supercritical CO_2 equipment manufacturers and biogenic CO_2 suppliers, identifying players capable of supporting large-scale, sustainable extraction systems.

Hybrid System Opportunity

Evaluated opportunities for integrating chromatography systems with supercritical CO_2 extraction platforms, enabling a hybrid system capable of extraction, in-line analysis, and purification to improve efficiency and product quality.

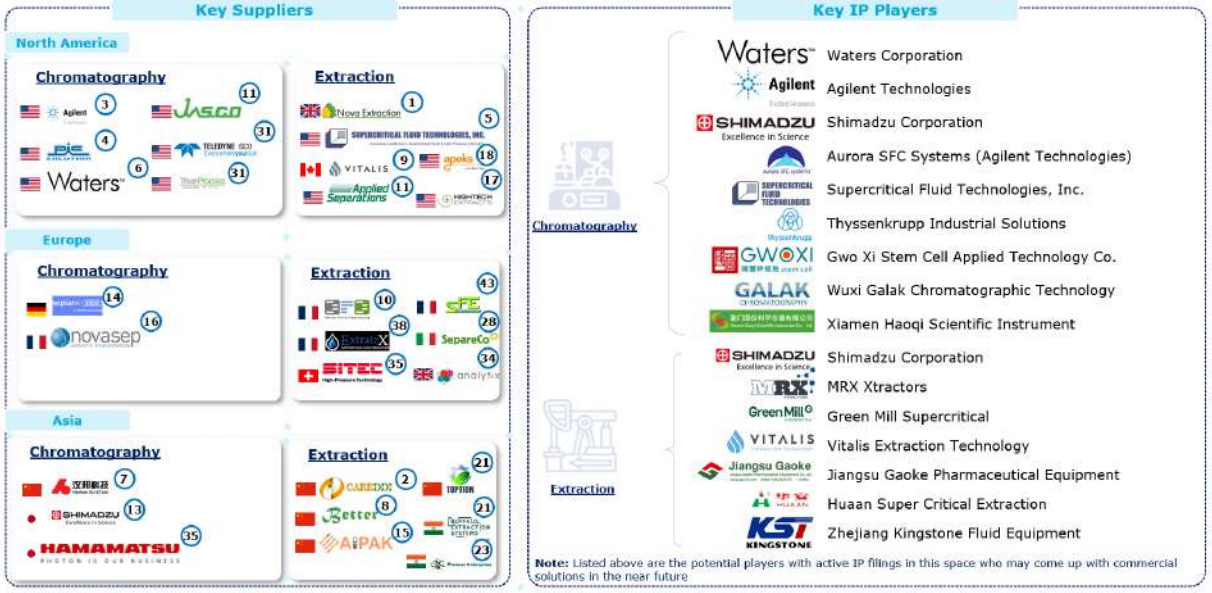
Sustainability & Recycling Focus

Examined the critical role of recycling technologies in supercritical CO_2 extraction, where recovery and reuse of CO_2 are essential to environmental performance and commercial viability.

Snippets

Executive Summary – Key Suppliers & IP Players

IeB believes that the extraction system via $scCO_2$ has been preferred by commercial equipment manufacturers over other technologies using $scCO_2$ as a solvent, as it is one of the processes in which disposal and/or recovery of residuals is a major environmental concern



Ingenious e Brain Notations: (XX) Denotes the ranking of the suppliers among the total 52 suppliers Source: IeB analysis

Executive Summary – Key Suppliers for Chromatography Systems

IeB believes that the chromatography system can have a better opportunity if it is incorporated into the extraction system and forms a hybrid system that can extract, analyze, and purify the product in succession

Key Supplier	Applications	Collaborations/Partnerships/ Customers	Recycling Technology	Growth Strategy	Source
#1 Agilent Technologies (>>)	• Pharmaceutical Industry • Biopharma Industry • Food Industry • Forensics Industry • Chemicals Industry	Imperial College London, Plasmion, scitara, NXVA	—	• Agilent Technologies has been diversifying its work profile and building instruments for genome studies, omics labs, and forensic labs • Agilent Technologies has been helping universities such as Monash University, Delaware State University, etc., in developing high-performance lab instruments	Link Link Link
#2 PIC Solution (>>)	• Pharmaceutical Industry • Chemical Industry • Decaffeination • Food Industry	Corden Pharma	✓	• PIC Solution has been building industrial scale-based equipment for companies that have successfully tested their lab instruments	Link
#3 Waters Corporations (>>)	• Pharmaceutical Industry • Chemicals Industry • Food Industry • E-Mobile Industry	Virginia Tech, R.J. Reynolds Tobacco, Peking University, universität innsbruck	—	• Waters Corporation has been focused on acquiring multiple diversified companies, such as Thar Instruments for chromatography solutions, Wyatt Technology for their light scattering technology, and advanced software solutions	Link Link
#4 Jasco Corporation (>>)	• Cannabis Industry • Pharmaceutical Industry • Chemical Industry • Agriculture foodstuff • Air purification • Decaffeination		—	• Jasco has been collaborating with multiple universities, such as the Ohio State University and the National Forensic Sciences University, India to provide support to over 700 programs and multiple research projects	Link
#5 Shimadzu Corporation (>>)	• Pharmaceutical Industry	大阪大学 OSAKA UNIVERSITY, NUS, NUS Environmental Research Institute, tetrascience	—	• Shimadzu Corporation has been working on improving scientific data for customers via collaborating with TetraScience, Inc. for their R&D Data Cloud	Link Link Link
#6 Sepiatec GmbH (Buchi) (>>)	• Pharmaceutical Industry • Chemical Industry	MASON TECHNOLOGY	✓	-	Link

Ingenious e Brain Legend: ✓ Yes — Info. Not Available

Source: IeB analysis

Impact

- Enabled the client to recognize chromatography–extraction hybrid systems as a differentiated opportunity to strengthen their product portfolio.
- Highlighted that supercritical CO_2 processes are best positioned when coupled with recycling technologies, ensuring sustainable operations in high-purity markets.
- Provided the client with a structured understanding of the supplier ecosystem for biogenic CO_2 sourcing and supercritical CO_2 equipment, aligning technology strategy with long-term sustainability goals.

Conclusion

By delivering targeted insights on the technology landscape, supplier universe, and system integration opportunities, IeB empowered the client to position itself as an innovator in sustainable extraction solutions. The case demonstrated that supercritical CO_2, when paired with recycling systems and hybrid process integration, offers a commercially viable and environmentally superior alternative to conventional organic solvents.

Ingenious e-Brain

Ingenious e-Brain is a global research advisory and management consulting firm that helps businesses future-proof their operations by addressing complex challenges with sustainable, strategic, and expert-led solutions. With a global network of over 300 domain experts, analysts, scientists, and consultants across 5 offices in 4 countries—we bring world-class research capabilities and a proven track record of delivering 5,000+ projects across various industries.

With over 13 years of proven excellence, we have successfully tackled business challenges for Fortune 500 and Global 1000 corporations, industry leaders, manufacturing giants, startups, investors, universities, and top companies across domains such as healthcare, sustainability, chemicals, advanced materials, automotive, energy, food & beverage, consumer packaged goods, and high-tech industries, particularly in the field of intellectual property and innovation.

Our services empower organizations to accelerate innovation, optimize R&D portfolios, and navigate complex intellectual property (IP) challenges, all while scaling operations with resilience. We support clients at every stage of the innovation process—from product launches and IP co-creation to market intelligence, consumer sentiment analysis, and gathering actionable customer insights through surveys.

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