

INDUSTRIAL CANNABINOID SEPARATIONS



CANNABINOID SEPARATION SOLUTIONS

ARi's HIPERCHROM system is an efficient solution for industrial cannabinoid purification. Refined in collaboration with the hemp industry, the process uses multicolumn SMB chromatography to continuously separate cannabinoids with high productivity and high recovery.



The HIPERCHROM system can be easily scaled to any size, from gram-scale to ton-scale. ARi has extensive experience supplying industrial chromatography systems for a variety of industries, with operating capacities of up to 750 tons/day for some applications.

ARi's HIPERCHROM system is a proven turnkey chromatography solution for large-scale THC remediation and other cannabinoid separations. A working demonstration system is available to view upon request.

HIPERCHROM SYSTEM ADVANTAGES

ARi's HIPERCHROM SMB chromatography system offers competitive advantages for the cannabis industry:

Continuous operation

Low operating cost

Small footprint

Easily scaled to any size (gram-scale to ton-scale)

Demonstrated long adsorbent life (>1 year)

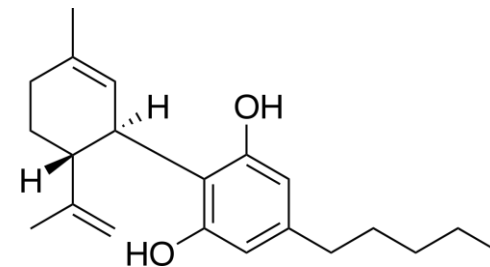
Low maintenance cost

Explosion-proof equipment (Class 1, Division 1, Group D)

High cannabinoid recovery (85 - 90%)

Customized product purities

Technical support provided

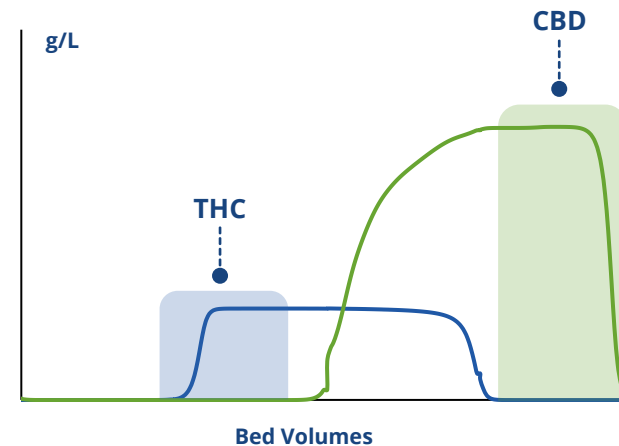


THC REMEDIATION

ARI's HIPERCHROM system is ideally suited for large-scale THC remediation. Operational flexibility allows for customized THC purities to be achieved. Compliant products (THC purity < 0.3%) can be produced at high levels of CBD recovery, and ARI's HIPERCHROM system can also meet the most exacting standards of remediation and produce THC-free products (THC purity < 0.01%).

The HIPERCHROM system can process a wide variety of feed material and has been shown to remediate material with up to 10% THC purity.

HIPERCHROM System Performance	
CBD Recovery	85 – 90%
THC Purity (Compliant Products)	< 0.3%
THC Purity (THC-Free Products)	Non-Detectable, <0.01%



ARI's HIPERCHROM system uses continuous chromatography to produce two purified product fractions. The fraction in green represents the remediated CBD-rich stream, which contains less than 0.3% THC purity. The fraction in blue represents the THC-rich reject stream.

INDUSTRIAL ADSORBENTS

The adsorbents used in ARI's HIPERCHROM systems are well adapted to industrial processes. Compared to traditional silica media, these adsorbents demonstrate greater mechanical stability, superior resistance to fouling, and longer lifetimes.

While silica adsorbents must be replaced every 3 – 5 weeks in cannabinoid applications, the adsorbents used by ARI have a lifetime greater than 1 year, providing a significant reduction in operating cost.

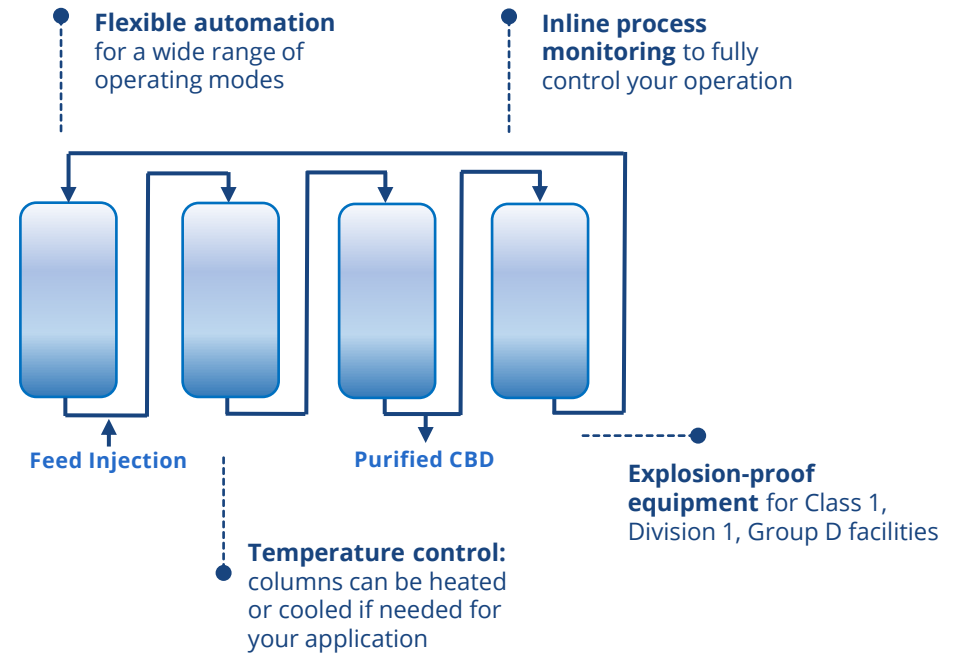
Adsorbent	Estimated Lifetime
Silica Gel	< 4 weeks
HIPERCHROM Adsorbents	> 1 year

SMB CHROMATOGRAPHY

Simulated moving bed (SMB) chromatography is a continuous, multicolumn separation process. Simulated countercurrent flow between the liquid and solid phases produces two purified product fractions with high productivity and high recovery.

SMB chromatography, known for application to cannabinoids for over a decade, is ideally suited for industrial separation processes such as large-scale THC remediation. Compared to batch chromatography, SMB requires significantly less separation media and eluent, allowing for higher productivity with lower operating costs.

ARI's HIPERCHROM SMB systems are highly automated, allowing for simple and reliable operation. Units have flexible control and can be customized for a wide range of operating modes.



SMB VERSUS BATCH

The continuous operation of SMB chromatography ensures efficient use of the adsorbent. This allows the SMB process to achieve high product yield and high purities while using less adsorbent and less eluent.

Compared to batch chromatography, SMB chromatography offers competitive advantages for industrial separations:

- 2 - 10x more productive
- Up to 10x reduction in eluent usage
- Up to 10x reduction in adsorbent volume
- Lower operating costs

	SMB	Batch
Type of Operation	Multicolumn	Single Column
Product Recovery	★★★	★★
Adsorbent Usage	★★★	★
Eluent Usage	★★★	★
Operating Cost	★★★	★
Footprint	★★★	★★

★★★ Excellent

★★ Good

★ Poor

SCALABILITY

The HIPERCHROM system can be reliably scaled to any size, from gram-scale for pilot testing to ton-scale for industrial operation. ARi has installed industrial chromatography systems for a wide range of applications worldwide, operating at capacities of up to 750 tons/day.

ARi's SMB systems are equipped with Fractal Fluid Distributors, a patented technology that provides uniform flow distribution across each chromatography column. This uniform distribution ensures that identical performance is achieved at every scale. *(More information can be found at www.arifractal.com/technologies.)*

HIPERCHROM systems can be provided for pilot testing, demonstration-scale testing, or industrial operation. Every system is custom designed and built to meet your needs.

Examples of HIPERCHROM System Sizes for Pilot, Demonstration, and Industrial Scales*

	Pilot	Demo	Industrial
Column Diameter (cm)	3 - 10	15 - 25	30 - 150
Productivity (kg CBD/day)	0.5 - 8	10 - 50	70 - 1000
Feed Flow Rate (L/day)	3 - 50	75 - 300	400 - 7000

**Dimensions are for example only. Every HIPERCHROM system is custom-built to suit your unique process.*

WORKING WITH US

In addition to supplying HIPERCHROM systems as a turnkey solution for THC remediation, ARi develops customized SMB solutions for new applications. ARi provides a wide spectrum of chromatography support for your unique process, from lab-scale testing to industrial installation.

Provide **proof of concept** information



LABORATORY-SCALE

Generate data to **model the separation**

Generate **engineering data** for scale-up



PILOT-SCALE

Demonstrate the separation process at a **small scale**

HIPERCHROM can be **reliably scaled-up** to industrial capacities



INDUSTRIAL-SCALE

Consistent performance is maintained through uniform fluid distribution

On-site support for troubleshooting and optimization



TECHNICAL SUPPORT

Onsite **technical audits and training** for chromatography



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