

M C P S E R V E R

N O C O D E

C L O U D H O S T E D

Butadiene Extraction Plant Design Engine

Model extractive distillation and recover high-purity butadiene.

Butadiene Extraction Plant Design Engine provides a specialized suite of engineering tools for modeling extractive distillation units. You can evaluate C4 feedstock, select optimal solvents like NMP or DMF, and calculate specific tower dimensions to ensure high-purity butadiene recovery.

A+ Quality Score 100/100

butadiene

distillation

chemical-engineering

c4-hydrocarbons

solvent-selection



The connectivity layer between AI and the world's software.

Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

Your AI Connections Run Through Vinkius Cloud

The world's largest
managed MCP catalog

Vinkius is the connectivity layer where AI connects to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.

— Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256

Encryption at rest

Ed25519

PKI vault signatures

24h TTL

Ephemeral session keys

V8 Isolate

Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT`https://edge.vinkius.com/{token}/mcp`

Claude



Cursor



VS Code



Windsurf



Grok



Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1)
Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

Get started at cloud.vinkius.com — connect your AI agent in under 60 seconds.

Butadiene Extraction Plant Design Engine MCP

4 tools available

Cloud-hosted on Vinkius

You can use this MCP to handle the heavy lifting of extractive distillation modeling. Instead of manual calculations for every design iteration, your AI client can run complex simulations for C4 hydrocarbon recovery. You'll use it to check if a specific feedstock is suitable for your process or to find the best solvent, such as NMP, DMF, or ACN, based on your purity targets. It handles the math for physical tower dimensions, including tray counts and column diameters, while predicting how much product you'll actually get from a given feed. It's built to manage the specific impurity challenges inherent in butadiene recovery, making it a practical tool for designing and optimizing extraction plants.

Core Capabilities

01 — Feedstock Analysis

Your agent checks if a C4 cut is suitable for the extraction process.

02 — Solvent Selection

The AI compares NMP, DMF, and ACN to find the best match for your purity needs.

03 — Column Sizing

Your client calculates diameter, tray count, and height for distillation towers.

04 — Yield Prediction

The tool estimates the final product quality and recovery amounts.

05 — Impurity Management

The engine models the impact of impurities during the distillation process.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/butadiene-extraction-plant-design-engine — connect your AI agent in three steps.

- 01 Connect your preferred MCP-compatible client to Vinkius.
- 02 Provide your feedstock composition or target purity to your AI agent.
- 03 The agent calls the specific engineering tools to run calculations.
- 04 Receive detailed design specs or yield predictions directly in your chat interface.

Connect your AI client to Vinkius to start running engineering simulations immediately.

Built For

This MCP is built for professionals working in petrochemical design and chemical processing.

Chemical Engineers

They hand off complex distillation math and column sizing to the AI.

Process Designers

They use the tool to iterate on solvent selection and feedstock suitability.

Plant Engineers

They use the engine to predict yields and evaluate existing feedstock quality.

What Changes When You Connect

- 01 Automates the calculation of physical column dimensions like diameter and height.
- 02 Provides data-driven solvent recommendations based on selectivity and boiling points.

-
- 03** Reduces manual modeling time for extractive distillation units.
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- 04** Directly links feedstock composition to predicted product yields.
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Real-World Applications

New Plant Design

Use the engine to determine the necessary column size and solvent type for a new butadiene recovery unit.

Feedstock Qualification

Check if a new batch of C4 hydrocarbons is compatible with your current extraction setup.

Solvent Optimization

Compare NMP against other solvents to improve selectivity for a specific purity target.

Yield Estimation

Run simulations to predict how changes in feed flow or solvent ratios affect final product output.

Patterns to Avoid

Guessing column dimensions

❌ AVOID

You try to estimate the height and diameter of a new tower based on rough rule-of-thumb calculations from an old project.

✓ INSTEAD

Use ``design_extraction_column`` to get precise data on tray count, diameter, and height for your specific design.

Manual solvent comparisons

❌ AVOID

You spend hours in a spreadsheet comparing the boiling points and selectivity of NMP versus ACN for a new feedstock.

✓ INSTEAD

Run ``select_optimal_solvent`` to let the MCP identify the best match for your purity targets automatically.

Ignoring feedstock variability

❌ AVOID

You assume every batch of C4 hydrocarbons will behave exactly like the last one during the distillation process.

✓ INSTEAD

Always use ``analyze_feedstock_composition`` to check if a specific hydrocarbon makeup is actually suitable for your process.

The Right Fit

Chemical engineers and process designers should connect this MCP if they need to automate distillation math. It is not for general-purpose AI users or those working outside of petrochemical extraction. The decision comes down to whether you need to move from manual modeling to rapid, data-driven design iterations.

Butadiene Extraction Plant Design Engine: 4 Specialized Tools

These tools handle the heavy lifting for extractive distillation modeling, from feedstock analysis to physical column sizing.

#	TOOL	DESCRIPTION
01	analyze_feedstock_composition	This tool evaluates the suitability of C4 feedstock for the extraction process. It analyzes the specific hydrocarbon makeup to determine recovery potential.
02	calculate_process_yield	This tool predicts the final product quality and total yield. It calculates how much butadiene you can expect to recover from your feed.
03	design_extraction_column	This tool calculates the physical dimensions of the distillation tower. It provides specific data on column diameter, tray count, and total height.
04	select_optimal_solvent	This tool identifies the most efficient extraction agent for your specific feedstock. It compares solvents like NMP, DMF, and ACN to find the best selectivity and boiling point match.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

U Evaluate a C4 cut with 0.4 butadiene, 0.3 butenes, and 0.3 butanes at a capacity of 500 units.



The feedstock suitability score is 0.75, with an estimated recovery potential of 92%.

U What is the best solvent for a feedstock with 0.5 butadiene and a target purity of 0.995?



NMP is the recommended solvent, offering a selectivity index of 0.88 and a boiling point suitable for this purity target.

U Design a column using NMP with a feed flow of 100 and a solvent-to-feed ratio of 5 for 0.995 purity.



The designed column will have a diameter of 2.4 meters, 35 trays, and a total height of 18.5 meters.

Frequently Asked Questions

01 What solvents can this MCP model?

The engine handles common extraction solvents including NMP, DMF, and ACN.

02 Can I use this with Claude or Cursor?

Yes, you can connect this MCP to any compatible client like Claude, Cursor, or Windsurf through Vinkius.

03 What kind of output do I get for column design?

The tool provides specific physical parameters including column diameter, the number of trays, and the total height.

04 Does it support C4 hydrocarbon modeling?

Yes, the MCP is specifically designed for modeling C4 feedstock and butadiene recovery.

05 How does it determine the best solvent?

It evaluates solvents based on their selectivity index and boiling point relative to your feedstock and purity targets.

06 How do I evaluate my feedstock?

You can use the `analyze\_feedstock\_composition` tool by providing the molar fractions of your C4 cut and the required plant capacity.

07 Can I design the physical column dimensions?

Yes, once you have selected a solvent, use `design\_extraction\_column` to calculate tower diameter, tray count, and total height.

08 How is the final product quality determined?

The `calculate\_process\_yield` tool determines the final recovery efficiency and impurity levels based on your column design and feedstock.

Go Live in 60 Seconds

Get your connection token from cloud.vinkius.com, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

`https://edge.vinkius.com/[TOKEN]/mcp`

CLIENT	WHERE TO CONFIGURE
 Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
 VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"butadiene-extraction-plant-design-engine": { "url": "..." }</code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
 Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

-  **Ask ChatGPT** 
-  **Ask Claude** 
-  **Ask Perplexity** 
-  **Ask Gemini** 
-  **Ask Grok** 

READY TO CONNECT

Butadiene Extraction Plant Design Engine is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and
start building. No SDK. No deployment. Just results.

Start at cloud.vinkius.com →

vinkius.com · support@vinkius.com

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DOCUMENT INFORMATION

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Platform	Vinkius Cloud for AI Agents
Endpoint	<code>https://edge.vinkius.com/{token}/mcp</code>

LICENSE & USAGE

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