

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

Alkylation Unit Design MCP

Build precise reactor models for high-octane gasoline production.

Alkylation Unit Design MCP gives your AI agent the engineering math needed to design refinery alkylation units. It handles the heavy lifting for reactor sizing, octane prediction, and acid cost analysis. Whether you are working with sulfuric or hydrofluoric acid, your agent can now model yields and optimize configurations based on specific olefin feeds.

A+ Quality Score 100/100

alkylation

gasoline

octane

refinery

chemical-engineering



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.

Alkylation Unit Design MCP

4 tools available

Cloud-hosted on Vinkius

You can now bring specialized refinery engineering logic directly into your AI client. This MCP provides the specific mathematical models required to design and optimize alkylation units. Instead of manually calculating reactor volumes or guessing octane numbers, you let your agent run the numbers using established chemical engineering principles.

You can model different catalyst environments, specifically accounting for the behavior of sulfuric and hydrofluoric acid. This allows for accurate predictions of how different olefin feeds will impact your final product quality. Your agent can determine the physical footprint needed for a new reactor, predict exactly how much alkylate you will produce, and calculate the economic impact of acid consumption. It's a way to move from high-level process ideas to concrete engineering specifications without leaving your coding or chat environment.

Core Capabilities

01 — Reactor Sizing

Your agent calculates the physical dimensions needed for a specific production volume.

02 — Product Quality Prediction

The AI estimates the octane number and yield based on feed and catalyst inputs.

03 — Cost Modeling

Your agent determines the economic impact of acid usage and volume requirements.

04 — Process Optimization

The AI finds the ideal feed and catalyst mix to meet octane specifications.

05 — Catalyst Modeling

The tool accounts for different acid types like sulfuric and hydrofluoric acid.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/alkylation-unit-design — connect your AI agent in three steps.

- 01 Connect your preferred MCP-compatible client to Vinkius.
- 02 Ask your agent to perform a specific alkylation calculation.
- 03 The agent calls the necessary engineering tools from this MCP.
- 04 The agent receives the calculated dimensions, yields, or costs.
- 05 You receive the technical results directly in your chat interface.

Connect your AI client to Vinkius and start running engineering calculations immediately.

Built For

This MCP is built for refinery engineers and chemical process designers who need to run rapid calculations within their AI workflows.

Process Engineer

Uses the agent to quickly validate reactor sizing and yield estimates.

Refinery Manager

Hands off technical parameters to the agent to run acid cost simulations.

Chemical Designer

Uses the optimization tools to find the best feed configurations for octane targets.

What Changes When You Connect

- 01 Reduces manual calculation time for reactor sizing and yield prediction.

- 02

Provides specific acid economics for sulfuric and hydrofluoric processes.
- 03

Connects engineering math directly to your AI client.
- 04

Enables rapid testing of different feed and catalyst combinations.

Real-World Applications

New Unit Design

Calculate the necessary reactor volume for a planned alkylation installation.

Operational Costing

Run economic models to see how acid consumption affects the bottom line.

Feedstock Optimization

Find the best isobutane to olefin ratio to hit a target octane number.

Catalyst Comparison

Compare the yield and octane results between sulfuric and hydrofluoric acid processes.

4 Tools Available

#	TOOL	DESCRIPTION
01	calculate_reactor_dimensions	This tool determines the physical size a reactor needs to meet your specific production targets.
02	estimate_yield_and_octane	Use this to predict the final quantity and octane quality of the alkylate produced.
03	optimize_unit_configuration	This tool suggests the best combination of feed and catalyst to hit a specific octane target.
04	calculate_acid_economics	This tool calculates the volume of acid required and the resulting operational costs for the process.

See It in Action

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

U What is the required reactor volume for an olefin feed rate of 50 with an isobutane ratio of 1.5 using sulfuric acid?



The required reactor volume is 1250 cubic meters with a residence time of 4.5 hours.

U Estimate the yield and octane number for a feed rate of 100, isobutane ratio of 2.0, and hydrofluoric acid.



The expected alkylate yield is 94% with an octane number of 96.5.

U Help me optimize my unit to reach an octane of 95 using 500 units of available isobutane and sulfuric acid.



To reach an octane of 95, the recommended isobutane ratio is 1.8, which results in an expected yield of 92% and an estimated reactor volume of 850 cubic meters.

Frequently Asked Questions

01 What kind of acid models are included?

The MCP includes models for both sulfuric acid and hydrofluoric acid to ensure accurate yield and octane predictions.

02 Can I use this with Claude or Cursor?

Yes, you can use this MCP with any MCP-compatible client including Claude, Cursor, and Windsurf.

03 What can the agent calculate for me?

Your agent can calculate reactor dimensions, estimate product yield and octane, optimize unit configurations, and determine acid economics.

04 Do I need to host the MCP myself?

No, Vinkius hosts and manages the MCP for you. You just connect your client and it is ready to use.

05 Is this for high-octane gasoline design?

Yes, the tools are specifically designed for calculating parameters for producing high-octane alkylate from olefin feeds.

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>"alkylation-unit-design": { "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

Alkylation Unit Design 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>

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