

MCP SERVER

NO CODE

CLOUD HOSTED

Ethylene Glycol Plant Designer MCP

Model reactor designs and optimize chemical production yields.

Ethylene Glycol Plant Designer is a specialized chemical engineering MCP for modeling ethylene oxide hydration and downstream separation. Use it to calculate reactor specifications, predict the distribution of MEG, DEG, and TEG, and determine the necessary distillation conditions for specific purity targets. It also handles the financial side by evaluating plant economics based on your throughput and product mix.

A+ Quality Score 100/100

chemical-engineering

ethylene-glycol

reactor-design

process-optimization

industrial-chemistry



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.

Ethylene Glycol Plant Designer MCP

4 tools available

Cloud-hosted on Vinkius

You can use this MCP to handle the heavy lifting of chemical process design for ethylene glycol production. Instead of manually running separate models for reactor sizing and distillation, you can ask your AI client to run the math for you. It models the hydration of ethylene oxide and the subsequent separation of MEG, DEG, and TEG. You can quickly iterate on reactor specifications by adjusting feedstock and target output, or tweak distillation parameters to hit exact purity requirements. It also lets you check if a design actually makes sense financially by looking at throughput and product mix. It's built to move from initial reactor sizing to full plant economic assessment in one conversation.

Core Capabilities

01 — Reactor Sizing

The AI calculates volume, residence time, and heat duty for your reactor design.

02 — Yield Prediction

Your agent estimates the specific distribution of MEG, DEG, and TEG.

03 — Distillation Optimization

The AI determines the operating conditions needed for the distillation train to hit purity targets.

04 — Economic Assessment

Your agent evaluates gross margins and operating costs based on plant capacity.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/ethylene-glycol-plant-designer — connect your AI agent in three steps.

- 01 Connect your preferred MCP-compatible client to Vinkius.
- 02 Ask your AI client to perform a specific chemical engineering calculation.
- 03 The AI invokes the necessary tool from this MCP.
- 04 The tool returns technical specifications or economic data.
- 05 Your agent presents the results for your review.

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

Built For

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

Chemical Engineers

They hand off reactor sizing and distillation parameter calculations to the AI.

Process Engineers

They use the tool to predict product yields and optimize separation trains.

Plant Managers

They use the economic tools to check the feasibility of new production designs.

What Changes When You Connect

- 01 Calculates reactor physical specs from feedstock data.
- 02 Predicts MEG, DEG, and TEG yields based on process parameters.

-
- 03** Determines distillation conditions for specific purity levels.
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- 04** Evaluates plant feasibility using throughput and product mix.
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Real-World Applications

Initial Reactor Sizing

You provide feedstock amounts and target capacity to get required reactor volume and heat duty.

Purity Control

You use the tool to find the exact distillation parameters needed for a specific product purity.

Yield Optimization

You adjust water-to-EO ratios and residence times to see how they change the product distribution.

Financial Feasibility

You check if a proposed plant design will be profitable given current EO costs and capacity.

4 Tools Available

#	TOOL	DESCRIPTION
01	evaluate_plant_economics	This tool checks if your design is financially viable based on your specific throughput and product mix.
02	calculate_reactor_design	Use this to find the physical specifications your reactor needs based on your feedstock and target output.
03	optimize_separation_parameters	This tool calculates the operating conditions required for your distillation train to reach a specific product purity.
04	predict_product_distribution	This tool estimates the resulting yields of MEG, DEG, and TEG from your process setup.

See It in Action

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

- U** Calculate the reactor design for 500 units of EO with a water-to-EO ratio of 10 and a target capacity of 1000.



The required reactor volume is 1250 m³, with a residence time of 45 minutes and a heat duty of 450 MW.

- U** What is the expected product distribution if the water-to-EO ratio is 15 and residence time is 60 minutes?



The expected yield is 85% MEG, 12% DEG, and 3% TEG.

- U** Estimate the plant economics for a design with 1000 units of capacity and EO cost of 50 per unit.



The projected gross margin is \$250,000 with an operating cost of \$150,000 and revenue of \$400,000.

Frequently Asked Questions

01 What chemical processes does this MCP model?

It models the hydration of ethylene oxide and the subsequent separation of MEG, DEG, and TEG.

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 kind of reactor data can I get?

You can get physical specifications like reactor volume, residence time, and heat duty.

04 Does it help with distillation design?

Yes, it provides the operating conditions for the distillation train to achieve specific product purity.

05 How does it handle plant economics?

It assesses feasibility by looking at your throughput, product mix, and capacity.

06 How do I calculate the reactor volume?

You can use the `calculate\_reactor\_design` tool by providing the available ethylene oxide, the target plant capacity, and the desired water-to-EO ratio.

07 Can I predict the yield of MEG, DEG, and TEG?

Yes, the `predict\_product\_distribution` tool estimates the yield of Monoethylene Glycol, Diethylene Glycol, and Triethylene Glycol based on the water-to-EO ratio and residence time.

08 How is the economic feasibility assessed?

The `evaluate\_plant\_economics` tool calculates operating costs, revenue, and gross margin using the reactor design, product distribution, and feedstock costs.

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>"ethylene-glycol-plant-designer": { "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

Ethylene Glycol Plant Designer 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

Generated	September 2026
MCP Server	Ethylene Glycol Plant Designer MCP
Server ID	01a0952b-e848-73c0-a980-d5e5c42f082e
Platform	Vinkius Cloud for AI Agents
Endpoint	https://edge.vinkius.com/{token}/mcp

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