MCP SERVER | NO CODE | CLOUD HOSTED

Asphaltene Precipitation Predictor MCP

Model crude oil stability and deposition risks with precision.

Asphaltene Precipitation Predictor provides specialized thermodynamic modeling to predict asphaltene stability in crude oil. Your AI client uses this MCP to calculate onset pressures, determine aggregation states, and evaluate the risks associated with gas injection or fluid commingling. It helps you manage deposition risks caused by pressure drops, temperature shifts, or mixing different crude streams.

A+ Quality Score 100/100

asphaltenes | crude-oil | thermodynamics | reservoir-engineering | precipitation-prediction

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vinkius.com/en/ai-agent-connect/asphaltene-precipitation-predictor

SCAN TO VIEW

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.

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.

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.

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	Ed25519	24h TTL	V8 Isolate
Encryption at rest	PKI vault signatures	Ephemeral session keys	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.

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.

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.

06 — Honeytoken Trap System

Phantom credentials are injected into isolated environments. If a honeytoken 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.

Agent Activity

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

FinOps

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

Tool Health

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

Firewall & DLP

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

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.

Asphaltene Precipitation Predictor MCP

4 tools available
Cloud-hosted on Vinkius

You can use this MCP to run complex thermodynamic models directly within your AI client. Instead of manually calculating stability margins, you can ask your agent to identify exactly when asphaltene precipitation begins in a specific oil system. It handles the heavy lifting of predicting how gas injection changes fluid stability and how mixing different crude oils might trigger unexpected deposition. This is built for reservoir and production engineers who need to mitigate risks from pressure drops or temperature changes. You get specific data on flocculation states and aggregation risks, allowing you to make decisions about fluid management and injection strategies before they impact your production hardware.

Core Capabilities

01 — Onset Pressure Calculation

Your agent calculates the exact pressure point where precipitation begins.

02 — Gas Injection Modeling

The AI predicts how specific gas additions impact asphaltene stability.

03 — Aggregation Analysis

Your client determines if fluids are in a state that causes asphaltene clustering.

04 — Fluid Mixing Assessment

The MCP evaluates precipitation risks when commingling different crude streams.

One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/en/ai-agent-connect/asphaltene-precipitation-predictor** — connect your AI agent in three steps.

01 Connect your AI client to the Vinkius hosted MCP.

02 Provide oil composition and thermodynamic parameters to your agent.

03 The agent calls the specific tool needed for your calculation.

04 The MCP executes the thermodynamic model and returns the result.

05 Your agent presents the stability data or risk assessment to you.

You connect the MCP to your AI client and start running thermodynamic queries.

Built For

This MCP is built for petroleum professionals managing fluid stability in production environments.

Reservoir Engineers

They use the MCP to model how pressure changes in the reservoir affect asphaltene stability.

Production Specialists

They use the tool to predict deposition risks in flowlines and surface equipment.

Fluid Analysts

They use the thermodynamic models to assess the impact of gas injection or oil commingling.

What Changes When You Connect

01 Calculates onset pressure margins for specific oil compositions.

02 Predicts aggregation states to identify flocculation risks.

03	Models the impact of gas injection on fluid stability.
04	Evaluates risks when mixing different crude oil types.

Real-World Applications

Gas Injection Planning

Predict if adding gas to a reservoir will trigger asphaltene precipitation.

Commingling Operations

Check if mixing two different crude streams will cause deposition issues.

Pressure Drop Monitoring

Determine the onset pressure to avoid precipitation during pressure declines.

Fluid Stability Testing

Assess the flocculation state of a fluid under specific temperature and pressure conditions.

Patterns to Avoid

Vague stability guesses

AVOID

Asking your agent if the oil is stable enough for production without providing specific composition data.

✓ INSTEAD

Provide exact fluid compositions and use `predict_flocculation_state` to get a definitive answer on aggregation risks.

Ignoring gas injection effects

AVOID

Assuming a reservoir will remain stable after a gas injection project begins.

✓ INSTEAD

Run `evaluate_gas_injection_impact` to see exactly how the added gas changes the stability of the asphaltenes.

Overlooking commingling risks

AVOID

Mixing two crude streams in a flowline without checking for deposition issues first.

✓ INSTEAD

Use `assess_commingling_risk` to evaluate the precipitation risk before you actually mix the fluids.

The Right Fit

Reservoir and production engineers should connect this MCP if they manage fluid stability in changing pressure or temperature environments. If your work doesn't involve crude oil compositions or gas injection modeling, you don't need this. The deciding factor is whether you need to predict precipitation before it hits your production hardware.

4 Specialized Thermodynamic Tools for Asphaltene Prediction

These tools handle the complex thermodynamic modeling required to predict fluid stability and precipitation risks.

#	TOOL	DESCRIPTION
01	`get_onset_pressure`	This tool identifies the specific pressure where asphaltene precipitation starts for a given oil system.
02	`evaluate_gas_injection_impact`	Use this to predict how adding a specific gas changes the stability of asphaltenes in the fluid.
03	`predict_flocculation_state`	This tool determines if the current fluid state will cause asphaltenes to aggregate into clusters.
04	`assess_commingling_risk`	This tool evaluates the risk of precipitation when you mix two different crude oils.

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 onset pressure for an oil with these molar fractions: {"C1": 0.1, "C2": 0.2, "Asphaltenes": 0.7} at 80 degrees Celsius with solubility parameters {"a1": 1.5, "a2": 0.5}?

The onset pressure for this oil system is 250.5 bar with a stability margin of 15.2 bar.

U Will injecting methane at a 0.15 ratio into this oil composition {"C1": 0.5, "C2": 0.5} at 50 degrees Celsius cause precipitation?

Yes, the injection will cause precipitation with a stability change of 0.45.

U What is the flocculation risk for an oil with density 0.85 and viscosity 5.2 at 40 bar and 60 degrees Celsius?

The current state is 'Aggregating' with a flocculation index of 0.65 and a High risk level.

Frequently Asked Questions

01 **What can this MCP do for crude oil analysis?**

It predicts asphaltene onset pressure, flocculation states, gas injection impacts, and commingling risks.

02 **Which AI clients can use this MCP?**

You can use it with any MCP-compatible client like Claude, Cursor, Windsurf, or VS Code.

03 **Do I need to host the MCP myself?**

No, Vinkius hosts and manages the MCP for you. You just connect your client and start using the tools.

04 **Can I use this to predict deposition in flowlines?**

Yes, by using the tools to assess flocculation states and onset pressures caused by pressure or temperature changes.

05 **How does it handle gas injection modeling?**

The evaluate_gas_injection_impact tool predicts how a specific gas addition changes the stability of the asphaltenes.

06 **What is the Onset of Precipitation Pressure (OPP)?**

OPP is the specific pressure at which asphaltenes begin to form solid aggregates. You can find this value using the `get_onset_pressure` tool.

07 **How does gas injection affect asphaltene stability?**

Injecting gases like methane or CO2 can reduce the solubility of asphaltenes. The `evaluate_gas_injection_impact` tool predicts the resulting stability change.

08 **Can I predict risks when mixing two different oils?**

Yes, the `assess_commingling_risk` tool evaluates the compatibility and precipitation probability when mixing different crude oil compositions.

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 `"asphaltene-precipitation-predictor": { "url": "…" }`
Windsurf	MCP Settings → `mcp_settings.json` → 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

Asphaltene Precipitation Predictor 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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LICENSE & USAGE

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