MCP SERVER | NO CODE | CLOUD HOSTED

Bioleaching Circuit Designer MCP

Model heap and tank leaching configurations with precision engineering tools.

Bioleaching Circuit Designer MCP gives your AI client the specialized math needed for sulfide ore processing. It handles the heavy lifting for reactor sizing, aeration requirements, and microbial kinetic checks. Whether you are designing large scale heap piles or stirred tank reactors, your agent can now run complex engineering calculations to ensure your leaching operations stay within biological and physical limits.

A+ Quality Score 100/100

bioleaching | sulfide-ores | reactor-design | mining-engineering | microbial-kinetics

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vinkius.com/en/ai-agent-connect/bioleaching-circuit-designer

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.

Bioleaching Circuit Designer MCP

4 tools available
Cloud-hosted on Vinkius

You can now use your AI client to run detailed engineering models for sulfide ore bioleaching. This MCP provides the specific tools required to design both heap and tank leaching setups. Instead of manually calculating volumes or aeration rates, you can ask your agent to handle the math based on mineralogy, bacterial kinetics, and temperature profiles.

If you are working on large scale operations, you can use this MCP to determine the physical requirements for heap leaching. For stirred tank setups, it calculates the necessary sizing and aeration. You can also use it to compare different leaching modes to see which method fits your specific ore profile better. To prevent operational failures, the MCP includes a check to ensure your operating temperatures don't exceed the biological kinetic constraints of your microbes. It turns your AI client into a specialized engineering partner for mining and metallurgical design.

Core Capabilities

01 — Reactor Sizing

Your agent calculates the exact volume needed for both heap and tank configurations.

02 — Aeration Modeling

The MCP determines the necessary aeration rates to support biological activity.

03 — Mode Comparison

Your AI client evaluates the trade-offs between heap and tank leaching methods.

04 — Biological Validation

The tool checks if temperature profiles align with microbial kinetic constraints.

05 — Retention Time Calculation

Your agent computes the required time for leaching processes to complete.

One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/en/ai-agent-connect/bioleaching-circuit-designer** — connect your AI agent in three steps.

01 Connect the MCP to your client like Claude or Cursor via Vinkius.

02 Provide your ore data, such as tonnage, temperature, and bacterial activity.

03 Your agent uses the specific design tools to run the calculations.

04 Receive detailed outputs for volume, aeration, and retention times.

Connecting this MCP to your AI client gives your agent immediate access to engineering math.

Built For

This MCP is built for professionals in the mining and metallurgical sectors who need to model bioleaching processes.

Mining Engineers

They use the MCP to design the physical layout of leaching operations.

Metallurgical Engineers

They rely on the tool to model mineralogy and bacterial kinetics.

Process Designers

They use the calculations to size reactors and aeration systems.

What Changes When You Connect

01 Reduces manual calculation errors in reactor sizing.

02 Provides instant comparison between different leaching methods.

03	Ensures biological viability through temperature constraint checks.
04	Automates the math for aeration and retention time requirements.

Real-World Applications

Heap Design Planning

Determine the physical footprint and aeration needs for a new large scale pile operation.

Tank Reactor Optimization

Calculate the volume and aeration for stirred tanks based on specific throughputs.

Method Selection

Compare the efficiency of heap versus tank leaching for a specific ore profile.

Operational Safety Checks

Verify that planned operating temperatures won't kill the microbial activity.

4 Tools Available

#	TOOL	DESCRIPTION
01	calculate_tank_design	This tool calculates the sizing and aeration requirements for stirred tank reactor bioleaching.
02	compare_leaching_modes	Use this to evaluate the efficiency and physical requirements of heap leaching versus tank leaching.
03	validate_microbial_viability	This tool checks if your planned temperature and kinetic activity stay within known biological thresholds.
04	calculate_heap_design	This tool determines the physical requirements for a heap leaching operation.

See It in Action

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

U Calculate the requirements for a heap leaching operation with 5000 tonnes of ore, a bacterial activity of 0.05, and a temperature of 35 degrees Celsius.

The heap design requires a reactor volume of 12500 m3, an aeration rate of 450 m3/h, and a retention time of 15 days.

U What is the tank design for a throughput of 50 tonnes per hour at 45 degrees Celsius with a bacterial activity of 0.08?

The stirred-tank reactor requires a volume of 850 m3, an aeration rate of 1200 m3/h, and a retention time of 17 hours.

U Compare heap vs tank leaching for an ore with specific mineralogy, 0.04 bacterial activity, 30 degrees, and 10000 tonnes.

Heap leaching requires 25000 m3 volume, while tank leaching requires 4200 m3. Tank leaching offers 25% higher efficiency for this specific profile.

Frequently Asked Questions

01 **What kind of ore is this MCP designed for?**

This MCP is specifically designed for sulfide ore bioleaching operations.

02 **Can I use this to design stirred tanks?**

Yes, the calculate_tank_design tool handles sizing and aeration for stirred-tank reactors.

03 **How does it handle biological constraints?**

The validate_microbial_viability tool checks if your temperature and kinetic activity are compatible with biological thresholds.

04 **Can I compare different leaching methods?**

Yes, the compare_leaching_modes tool allows you to evaluate the efficiency and requirements of heap versus tank leaching.

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

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

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 `"bioleaching-circuit-designer": { "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

Bioleaching Circuit 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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Platform	Vinkius Cloud for AI Agents
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