MCP SERVER | NO CODE | CLOUD HOSTED

# Precision Dilution Calculator MCP for AI Agents

## Accurately Calculating Reagent Mixes for Chemistry Labs

The Precision Dilution Calculator handles exact mixing ratios for lab work. It tells you precisely how much concentrated stock solution and solvent to combine to hit a specific target concentration and total volume. You eliminate manual math errors when preparing reagents, saving time and expensive materials in the chemistry lab.

A+ Quality Score 100/100

chemistry | dilution | laboratory | precision | calculation

MAINTAINED BY VINKIUS CLOUD FOR AI AGENTS · JULY 2026
vinkius.com/mcp/precision-dilution-calculator

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.

# Precision Dilution Calculator MCP

3 tools available
Cloud-hosted on Vinkius

Preparing solutions that require precise dilution is a fundamental skill in any scientific or industrial setting. This MCP calculates exactly what volumes you need. Instead of relying on tedious manual calculations or looking up complex formulas, your AI client handles it instantly. It works using the established $C_1V_1 = C_2V_2$ principle to ensure accuracy.

For instance, if you need 500 milliliters of a solution at a specific percentage, the tool tells you exactly how much concentrate and solvent to measure out. Furthermore, it includes safety checks, letting you verify that your target concentration is even physically possible with your current stock materials. This kind of high-precision support means less guesswork and better repeatability in research or quality control. Because Vinkius hosts this MCP alongside thousands of others, you connect once from any compatible client to get access to specialized tools like this one for chemistry.

## Core Capabilities

**01 — Calculate the precise recipe volumes**

Determines the exact milliliters of stock solution and solvent required for a target concentration and volume.

**02 — Check dilution feasibility**

Validates if your requested final parameters, like concentration or total volume, are scientifically possible given your starting materials.

**03 — Determine the scale of the process**

Calculates the overall dilution factor, giving you a clear understanding of how much the solution is being scaled down.

## One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/mcp/precision-dilution-calculator** — connect your AI agent in three steps.

01 Provide your AI client with three inputs: the starting concentration (C1), the desired final concentration (C2), and the required total volume (V2).

02 The MCP runs the calculations, determining the specific volumes of concentrate and solvent needed to meet those parameters.

03 You receive a clear, actionable recipe—the exact milliliters of each component you must measure out.

The bottom line is, it takes complex stoichiometry math and converts it into simple, measured steps for your lab bench.

## Built For

This MCP is essential for anyone who works with standardized solutions, reagents, or chemical formulations. If you're tired of recalculating dilution ratios by hand or worrying about compounding measurement errors, this tool saves time and keeps your experiments accurate.

**Research Scientist**

Uses the calculator to prepare custom reagents for varied experimental conditions, ensuring every batch starts with precise stoichiometry.

**Lab Technician**

Manages daily solution prep, verifying dilution recipes and calculating solvent volumes for quality control samples efficiently.

**Industrial Chemist**

Develops and validates industrial chemical formulations, using the tool to ensure product batches meet stringent concentration standards.

## What Changes When You Connect

01 Stop guessing volumes. The `calculate_dilution_recipe` tool tells you the exact milliliters of stock and solvent, eliminating guesswork when preparing samples.

02 Boost safety by running preliminary checks with `validate_dilution_bounds`. This ensures your target concentration is actually possible before you waste reagents or time.

03 Understand the scope of your experiment immediately. Use `get_diluent_ratio` to get a clear dilution factor, which helps document the process thoroughly for reports.

04 Improve lab repeatability across teams. By automating precise volume calculations, every user gets consistent starting materials, regardless of who runs the prep work.

05 Save expensive reagents. The MCP's validation tools prevent you from running failed experiments based on impossible concentration targets.

## Real-World Applications

**Preparing a standard buffer solution**

A scientist needs 2 liters of pH-buffered saline for an assay. They ask their agent to calculate the necessary volumes, and it uses `calculate_dilution_recipe` to provide precise measurements of both stock base and solvent.

**Troubleshooting a concentration error**

A QC manager runs a batch that is too weak. They input the current stock and desired target into the system, which uses `validate_dilution_bounds` to confirm if the required dilution is chemically sound.

**Scaling up an experiment**

A researcher needs to move from a 10ml test sample to a 5-liter industrial batch. They use `get_diluent_ratio` to instantly determine the precise scaling factor, preventing massive measurement errors.

# Patterns to Avoid

## Manual calculation using formulas

✗ AVOID

Writing down $C_1V_1=C_2V_2$ on paper and manually plugging in numbers. This is slow, requires specialized knowledge, and is highly prone to simple arithmetic errors.

✓ INSTEAD

Let your agent use the `calculate_dilution_recipe` tool. Just provide the starting values, and it outputs the correct volumes immediately, guaranteeing precision.

## Assuming dilution parameters are valid

✗ AVOID

Deciding to mix solutions based on general knowledge without checking if the target concentration is actually higher than your stock material (e.g., trying to make 15% from 10%).

✓ INSTEAD

Always run `validate_dilution_bounds` first. This tool acts as a safety net, telling you immediately when your requested dilution parameters are physically impossible.

## Ignoring the scale of change

✗ AVOID

Jumping from small benchtop tests to large industrial volumes without calculating the proportional difference.

✓ INSTEAD

Use `get_diluent_ratio` when scaling up. It provides a clear factor, ensuring that your final massive batch is perfectly representative of your initial test.

## The Right Fit

You should use this MCP if your work relies on high-precision stoichiometry, like preparing biological buffers or standardizing reagents in a QC lab. Use it anytime you need to convert concentrations and volumes into an actionable recipe.

Don't use this if you are simply mixing two things by volume without needing a specific concentration target (e.g., just mixing water and dirt). For general mixing, simpler volumetric tools work better. If your primary need is tracking inventory or managing equipment maintenance schedules, look for a dedicated asset management MCP instead.

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# Precision Dilution Calculator: Solving Chemistry Reagent Preparation

When preparing solutions in the lab, the process is tedious. You're looking at multiple reference sheets, copying down formulas like $C_1V_1=C_2V_2$, and manually calculating every single milliliter required. This back-and-forth work wastes time, forces you to juggle several tabs, and introduces a high risk of human arithmetic errors.

With this MCP, the process shifts entirely. You tell your agent the starting material, the target concentration, and the final volume. It immediately calculates the precise amounts needed for both stock solution and solvent. You get an actionable recipe in seconds—no manual math required.

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# Precision Dilution Calculator: Streamlining Laboratory Validation

Manual validation is a headache. Before starting, you have to mentally (or physically) check if your target concentration even makes sense compared to what you actually possess in the stockroom. This step is critical, but it's easy to overlook or do wrong.

The MCP eliminates this guesswork with `validate_dilution_bounds`. You just input your desired parameters, and it instantly confirms whether that dilution is chemically possible from your existing materials. It provides immediate scientific assurance for every experiment.

# Precision Dilution Calculator: 3 Tools for Chemistry Dilution

Use these tools to perform precise calculations, validate mixing parameters, and generate exact dilution recipes instantly.

| # | TOOL | DESCRIPTION |
|---|---|---|
| 01 | `calculate_dilution_recipe` | Determines the exact volumes of concentrate and solvent needed for a specific dilution task. |
| 02 | `get_diluent_ratio` | Calculates the overall scale or factor by which your solution is being diluted. |
| 03 | `validate_dilution_bounds` | Checks if your desired concentration and volume parameters are scientifically achievable with your starting stock. |

# See It in Action

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

**U** How much 70% ethanol do I need to make 500ml of 5% ethanol?

**Dilution Recipe**

- **Target Volume:** 500.0 mL
- **Required Stock (70%):** 35.71 mL
- **Solvent Needed:** 464.29 mL

This mix yields a precise, stable solution.

**U** Can I dilute a 10% buffer down to 15%?

**Validation Check: IMPOSSIBLE**

The target concentration (15%) is higher than the available stock concentration (10%). You cannot increase the concentration through dilution. Please check your input values or adjust your goal.

**U** What's the dilution factor for 20% to 2%?

**Dilution Ratio:** 10.0

The solution is being diluted by a factor of **ten**. This means every part of your final mixture represents 1/10th of the original stock concentration.

# Frequently Asked Questions

01 **How does the Precision Dilution Calculator help with stoichiometry?**

It solves complex mixing ratios for you. You input your starting materials and desired end state, and the MCP delivers the exact volumes needed to ensure perfect stoichiometry every time.

02 **Can I use this tool if my target concentration is too high?**

No, that's exactly what it prevents. The calculator includes a validation step that will tell you immediately if your requested parameters are chemically impossible to achieve via dilution.

03 **Does the Precision Dilution Calculator work for large industrial batches?**

Yes. It handles scaling up by calculating the required dilution ratio, ensuring that whether you're mixing 10ml or 5 liters, the proportions are perfectly accurate.

04 **Is this better than just using a standard chemistry formula sheet?**

It's much faster and safer. Instead of copying formulas and doing manual math prone to errors, you simply input your values into the system, and it handles all the complex calculations for you.

# 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 `"precision-dilution-calculator": { "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

# Precision Dilution Calculator 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 | July 2026 |
| MCP Server | Precision Dilution Calculator MCP |
| Server ID | `019f2669-b6dc-73f6-98a3-5fa8b16eb537` |
| Platform | Vinkius Cloud for AI Agents |
| Endpoint | `https://edge.vinkius.com/{token}/mcp` |

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