AEVION QVenture — Investment Memo

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FICTIONAL EXAMPLE: the company in this example is made up; any resemblance of names is coincidental. All figures are model output on invented inputs.

Vault Bio

Biotech / Therapeutics · series-a · US · raising $22,000,000

Score 59/100 — WATCH (conviction: low)

Signal coverage: 0% company-specific (0 metrics parsed from the plan); remainder from sector priors.

Investment memo

Verdict: watch, with a small conditional first check rather than a pass. Vault's most compelling attribute is that it is fundamentally mispriced by the quant model — this is an industrial-enzyme business, not a therapeutic, so it sidesteps the FDA IND!'BLA gauntlet and binary trial risk the composite penalizes, addressing a real ~$8–10B enzyme market at genuinely attractive margins if it captures per-kg value. The single strongest reason against is the undisclosed contract economics: if the three discovery agreements assign co-developed enzyme IP or manufacturing rights to the chemical majors, Vault collapses into a fee-for-service CRO and the platform thesis evaporates — and with zero quantified metrics (no titer, Tm, cost-per-kg parity, or royalty terms), we cannot yet verify it isn't. Plan: do not lead the full ticket. Offer an initial $3M for ~4% contingent on a data room proving (1) enzyme IP ownership retained, (2) one pilot at cost-parity with petrochemical incumbents, and (3) royalty/per-kg terms; reserve $5M for pro-rata on that de-risking, capping total exposure near $8.6M.

Narrative engine: model anthropic (per-part source not recorded)

Entry strategy

Ticket: $5,378,400 target (range $2,689,200–$8,605,440)
Target ownership: 7.2%
Valuation band (pre-money): $25,675,000 / $52,700,000 / $105,400,000
Modelled return (not a forecast): 5.27x multiple (9.5x base) · horizon 6yr · loss prob 45%

Deployment schedule:

- 60% — Entry: On close, after commercial + legal + financial diligence.
- 40% — Pro-rata: Reserve to maintain ownership through the next round.

Portfolio: Size at ~0.9% of a diversified venture portfolio (fractional-Kelly, conviction-scaled). Reserve 8,067,600 USD for pro-rata follow-on.

Score breakdown

Market size & growth — 74/100 (weight 14%)
~$1770B TAM, 14% CAGR (Biotech / Therapeutics).

Timing / tailwinds — 55/100 (weight 5%)
Sector growth 14% vs. 12% neutral baseline.

Moat / defensibility — 60/100 (weight 16%)
ip patents is the category's mature moat (ceiling 80), but ~55% realized at series-a given disclosed traction — an unproven moat is discounted toward the 35 "no demonstrated defensibility" floor.

Unit economics potential — 61/100 (weight 15%)
~85% mature gross margin, capital intensity 95% (sector reference).

Team / execution signal — 58/100 (weight 28%)
commercial validation cited

Scientific / tech feasibility — 46/100 (weight 7%)
AI protein design, base/prime editing, patient-derived organoid screens

Regulatory / legal headroom — 36/100 (weight 7%)
Regulatory intensity 98% (higher = more legal drag).

Competitive headroom — 65/100 (weight 8%)
Competitive intensity 50%. binary trial risk and 8–12yr capital-intensive timelines.

Analyst council

Research Scientist — Industrial enzyme design is more tractable than the 46 implies — but the score conflates it with therapeutic-grade biology it doesn't do

+ The 46/100 feasibility score is mis-anchored: it inherits therapeutics-sector frontier priors (base/prime editing, organoid screens, 8-12yr binary trials) that are irrelevant to an industrial-enzyme platform. Vault faces no clinical trials — its 'endpoint' is kcat/Km, thermostability (Tm), and titer in a bioreactor, measurable in weeks. On the correct benchmark I'd argue feasibility is closer to 6

+ Generative protein design is genuinely at an inflection: AlphaFold2/3, ESMFold and diffusion models (RFdiffusion, ProteinMPNN) now produce de novo binders and enzymes with experimentally validated success rates that have risen from <1% to double-digits for some scaffolds. Thermostabilization (raising Tm 10-20°C via consensus/ML-guided mutation) is one of the most de-risked applications — FoldX/Ros

+ Wet-lab-in-the-loop is the correct architecture and the key credibility signal: it means they treat models as hypothesis generators, not oracles, closing the design-build-test-learn gap where pure in-silico plays fail. This directly counters hand-wavy 'AI designs enzymes' claims.

+ Traction is real and domain-appropriate: 3 paid discovery contracts with chemical majors, one enzyme at pilot scale, $3.4M committed milestones. For industrial biocatalysis, pilot-scale + repeat majors is a stronger technical proof than any published benchmark — it means an enzyme survived scale-up, the usual failure point.

! Scale-up (the pilot!'commercial cliff) is the true technical risk, not design. Enzyme performance at bench (mg) routinely degrades 10-100x in titer/stability under industrial conditions (solvents, high substrate load, continuous flow, 60-90°C). One pilot enzyme is n=1; the platform's repeatability across chemistries is unproven.

! Moat is thin where it matters: enzyme sequences are patentable but easily designed-around, and the real defensibility is proprietary assay/training data — none disclosed. Incumbents (Codexis, Novozymes/Novonesis, Ginkgo) have 15+ yrs of directed-evolution datasets Vault cannot yet match; the 60/100 moat score is generous absent data-asset disclosure.

! Zero quantified plan metrics (0% signal coverage): no titer, Tm improvement, cost-per-kg vs petrochemical incumbent, or hit-rate figures. For a science-driven bet this is a material diligence gap — cost-per-kg parity with petrochemical catalysts is the binary de-risking milestone and it is entirely unstated.

Data Analyst — ~$1770B TAM, 85% mature gross margin.

+ Market factor 74/100; unit-economics factor 61/100.

+ Reference gross margin ~85%; validate against actuals.

+ Execution signal 58/100 — commercial validation cited.

! TAM/SAM/SOM and CAC/LTV unconfirmed — require a live data room.

! Sector benchmarks are directional, not company-specific.

Economist — Industrial-enzyme play mispriced by a therapeutics TAM; real market is ~$8-10B enzymes, not $1.77T pharma

+ The 74/100 market score is miscategorized. This is industrial biocatalysis, not therapeutics — the relevant TAM is the ~$8-10B industrial enzyme market (~6-7% CAGR), not a $1.77T pharma pool at 14%. That inflates size but the more honest frame lowers growth. Net: I'd mark this to ~58-62, because the specialty-chemical enzyme wedge Vault targets is a subset (~$2-3B addressable), though margin quali

+ Positive structural note: mislabeling as 'Biotech/Therapeutics' also imports the wrong risk profile. Vault has NO binary trial risk and NO 8-12yr FDA timeline — it sells enzymes B2B to chemical majors, so revenue is contract- and milestone-gated, not approval-gated. The regulatory (36) and competitive (65) scores penalizing trial risk are largely inapplicable and should be revised upward.

+ Demand economics are favorable where a thermostable enzyme genuinely displaces a petrochemical catalyst: buyers face energy/decarbonization pressure and price-inelastic switching once qualified into a process line. That creates high switching costs and a supply-side moat via qualified-supplier lock-in — a more durable rent than the IP patents the model leans on.

+ Rents accrue to whoever owns the wet-lab-in-the-loop data flywheel plus per-molecule process IP, not to the generative model itself (which commoditizes). 3 paid contracts + 1 pilot + $3.4M committed milestones is credible early validation, but $3.4M is discovery-stage revenue, not proof of production-scale royalty economics.

! Value-capture asymmetry: chemical majors have the fermentation/scale-up capacity and may license the enzyme then internalize manufacturing, capturing the margin while Vault earns one-time discovery fees. Without disclosed royalty or per-kg economics, the 85% gross-margin assumption is unverified — no LTV/CAC or revenue projection was supplied (0% signal coverage).

! Scale-up cliff: lab thermostability rarely survives to industrial titer/yield economics; a single pilot does not prove the enzyme beats the incumbent petrochemical catalyst on fully-loaded cost. Capital intensity flagged at 95% — $22M Series A likely funds only 2-3 more programs before another raise.

! Competitive incumbency: Novozymes/Novonesis, DSM-Firmenich and Codexis already run enzyme-engineering platforms at scale with decades of process data and customer relationships. Vault's generative edge must translate into faster/cheaper hits than well-capitalized incumbents — an unproven, not disclosed, differentiation.

Corporate & Regulatory Lawyer — Regulatory score misreads Vault as a drug developer; industrial enzymes skip the FDA IND!'BLA gauntlet — headroom is materially better than 36

+ The 36/100 imports a 98% 'regulatory intensity' prior anchored to therapeutics (IND!'NDA/BLA, GxP, binary trial

risk, 8–12yr timelines). That gauntlet does not apply here: Vault sells enzymes for specialty-chemical manufacturing, not medicines. The governing regimes are TSCA (EPA new-chemical/microbial review — enzymes/engineered strains may need a TSCA §5 PMN/MCAN, ~90-day review) and OSHA/EPA pro

+ IP posture is the load-bearing asset and the model's 60/100 moat (55% realized) is fair-to-generous: generative-protein sequences face uncertain composition-of-matter patentability (Myriad/Mayo §101 exposure for 'products of nature'-adjacent sequences), so protection likely leans on trade-secret over the AI weights, training data, and wet-lab process — durable but fragile to employee departure. Co

+ Deal structure: standard Reg D 506(b) or 506(c) priced Series A — insist on 1x non-participating pref, broad-based weighted-average anti-dilution, pro-rata, board seat (not mere observer given $22M / early stage), and IP-representation warranties with a specific carve-out that all inventor/employee IP is assigned and that customer discovery contracts do not grant the chemical majors background-IP

+ The three paid discovery contracts are the strongest signal but also the sharpest legal risk vector: verify whether the chemical-major agreements assign foreground IP to Vault or the customer, whether they contain exclusivity/non-compete field restrictions, and whether the $3.4M milestone payments are contingent on regulatory (TSCA) clearance of the pilot enzyme.

! Customer-contract IP leakage: if the discovery agreements grant the chemical majors ownership or exclusive fields over the co-developed enzymes, Vault's platform value collapses to a fee-for-service CRO — the single biggest undisclosed legal item; 0 quantified fields and no contract terms in the plan means this is unverified.

! §101 patentability gap: engineered protein sequences may be unpatentable as products of nature, forcing reliance on trade secret, which offers no protection against independent re-derivation by better-funded incumbents (Ginkgo, Codexis) — the 'ip patents mature moat' assumption in the model may not hold for this asset class.

! TSCA/biosafety timing: a genetically engineered production strain can trigger an EPA MCAN and potential containment/field-release review, adding 3–12 months per commercial enzyme before scale-up — modest vs. FDA but capable of stalling the milestone-payment schedule and thus the runway on a $22M raise.

Market data sources

- Precedence Research (2025) — Biotechnology ~$1.77T in 2025, ~13.6% CAGR to 2035
  https://www.precedenceresearch.com/biotechnology-market
- Grand View Research (2025) — To reach $3.88T by 2030 at 13.96% CAGR
  https://www.grandviewresearch.com/industry-analysis/biotechnology-market

Assumptions & limitations

- Market size / growth for Biotech / Therapeutics is anchored to Precedence Research (2025): Biotechnology ~$1.77T in 2025, ~13.6% CAGR to 2035. Full citations are listed under "Market data sources".
- Signal coverage: ~0% of the score is backed by the plan's own disclosed metrics (0 quantified fields); the remainder uses Biotech / Therapeutics sector priors — add financials to raise it.
- Stage norms reflect US-market series-a deals; adjust for geography "US".
- Score is a screening signal, not a substitute for legal, financial, and technical due diligence.

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