

Industrial Biocatalysts for Chemical Synthesis

ANMD-MRS21-207 · Industrial & Environmental Biotechnology

A Global Sustainability Due Diligence & Market Research Study

History 2020–2024 · Base Year 2025 · Forecast 2025–2032 · Outlooks 2035 / 2040 / 2050 · Currency US\$

WHY THIS REPORT

Industrial biocatalysts are enzymes deployed as selective catalysts in chemical synthesis — performing hydrolysis, reduction/oxidation and transamination with stereoselectivity and under mild conditions that conventional catalysis struggles to match. Central to green chemistry, they cut solvent, energy and waste in pharma, fine-chemical, flavour-and-fragrance and agrochemical manufacture. This decision-grade study sizes the global market in value and volume (with catalytic activity as a performance lens), across catalyst type, reaction scale, application and end-user, across seven regions and four scenarios to 2032, with outlooks to 2050.

SUSTAINABILITY & SDG IMPACT — THE ANMD LENS

Sustainability is this report's backbone. Beyond selectivity, biocatalysts deliver measurable solvent and energy reduction, waste-stream avoidance and safer process chemistry, strengthening the green-chemistry story.

Mapped Sustainable Development Goals:

SDG 9 Industry & Innovation	SDG 12 Responsible Consumption	SDG 13 Climate Action
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Measurable sustainability outcomes assessed:

- Solvent and energy reduction in chemical synthesis
- Waste-stream avoidance and safer process chemistry
- Chiral and complex-molecule routes replacing precious-metal catalysis
- Enzyme biosafety, strain containment and process-claim substantiation as material risks

Framework alignment: Double materiality mapped to GRI, SASB, ISSB, TCFD, TNFD, CSRD and the EU Taxonomy, with greenwashing and SDG-washing screens applied throughout.

WHAT'S INSIDE AT A GLANCE

53 Chapters	9 Report Parts	7 Regions Covered	40+ Country Markets
2025–32 Forecast Horizon	4 Forward Scenarios	25+ Companies Profiled	5 SDGs Mapped

REPORT COVERAGE

Geographic scope: North America, Europe, Asia Pacific, Latin America, Africa, Middle East and Rest of World — with named country intelligence. Europe leads green-chemistry adoption (Germany, Switzerland, Netherlands) on a deep pharma and fine-chemical base; North America scales on pharma API demand; Asia Pacific is the manufacturing engine (China, India); other regions assessed on their own merits.

MARKET OVERVIEW

From selective niche to mainstream synthetic strategy.

Biocatalysis is moving from selective niche to mainstream synthetic strategy. Demand is driven by green-chemistry mandates, pharma process-intensification, and enzyme-engineering breakthroughs that widen accessible reactions, against enzyme stability, substrate-scope limits and development cost. The market is read in value and volume — with catalytic activity as a performance lens — and forecast under four scenarios, each region reported separately.

- **Europe leads green-chemistry adoption** — a deep pharma and fine-chemical base and strict solvent-and-waste regulation
- **North America scales on pharma** — U.S. API and contract-manufacturing demand pulling biocatalytic routes
- **Asia Pacific is the manufacturing engine** — China and India integrating biocatalysis into API and fine-chemical production
- **Enzyme engineering is the differentiator** — directed evolution tailors selectivity and stability to specific molecules, replacing precious-metal and harsh catalysis

REGIONAL OUTLOOK

Across seven reporting regions, the report separates deployment leaders from high-growth and emerging markets — each profiled in full rather than aggregated into Rest of World.

Region	Stage	Lead Country Markets & Drivers
Europe	Green-chemistry leader	Germany, Switzerland, Netherlands — pharma base, solvent-waste rules
North America	Pharma-driven	United States — API and contract-manufacturing demand
Asia Pacific	Manufacturing engine	China, India — API and fine-chemical integration
Latin America	Emerging	Brazil — agrochemical and fine-chemical adoption
Africa	Frontier	South Africa — specialty-chemical capacity
Middle East	Frontier	UAE, Saudi Arabia — chemical diversification investment

KEY MARKET DRIVERS & RESTRAINTS

Drivers	Restraints
• Green-chemistry & solvent-waste reduction mandates • Pharma API process-intensification • Enzyme-engineering selectivity & stability gains • Precious-metal-catalyst cost & supply risk • Chiral and complex-molecule demand	• Enzyme stability in process conditions • Substrate scope & reaction-range limits • Biocatalyst development time & cost • Immobilisation and reuse economics • Integration into existing chemical plants

SEGMENTATION SNAPSHOT

By Catalyst Type	Hydrolases · ketoreductases · transaminases · oxidoreductases · engineered enzymes
By Reaction Scale	Lab / discovery · pilot · commercial-scale
By Application	Hydrolysis · reduction / oxidation · transamination · C–C bond formation
By End User	Pharma · fine chemicals · flavours & fragrances · agrochem
By Business Model	Product sale · custom enzyme · managed-service · licensing
By Deployment Scale	Discovery · pilot · industrial

TABLE OF CONTENTS — PARTS & CHAPTERS

The full report is organised into nine parts across 53 chapters, listed below. Detailed sub-headings, country tables and directories are provided in the full report.

Part I — Report Foundation, Discovery and Strategic Intelligence

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- › Chapter 2. Industry Discovery Summary — Industrial Biocatalysts for Chemical Synthesis
- › Chapter 3. Executive Intelligence and Decision Dashboard
- › Chapter 4. Strategic Findings, Materiality and Investment Verdict Preview

Part II — Market Intelligence, Sizing, Forecasting and Segmentation

- › Chapter 5. Industry Overview and Market Evolution
- › Chapter 6. Market Dynamics
- › Chapter 7. Global Market Size and Forecast, 2020–2032
- › Chapter 8. Market Segmentation Analysis
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- › Chapter 10. Pricing, Cost and Commercial Model Intelligence

Part III — Regional and Country Intelligence

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- › Chapter 53. Reference Annexes

COMPETITIVE & INVESTMENT SNAPSHOT

The competitive field spans dedicated biotech specialists, established industrial-biotech majors and integrated producers. Deal activity — M&A, technology acquisition and platform expansion — signals a market consolidating around scalable, bankable, deployment-ready solutions.

Representative players profiled in the full report:

Novonesis A/S · BASF SE · Koninklijke DSM-Firmenich AG · F. Hoffmann-La Roche AG · Merck KGaA · and further profiled biocatalyst players incl. EnginZyme AB, c-LEcta GmbH (Kerry Group plc) and Syngene International Limited

Investment intelligence: venture, infrastructure, development, climate and blended finance, green bonds and sustainability-linked loans — culminating in a bankability assessment and a clear investment verdict.

KEY QUESTIONS THIS REPORT ANSWERS

- ? How large is the global biocatalysts market, and how fast will it grow to 2032?
- ? Which regions, catalyst types and reactions offer the strongest risk-adjusted opportunity?
- ? How do enzyme engineering and immobilisation change cost per kilogram and synthetic reach?
- ? Who leads, and where is the competitive and patent white space?
- ? Is the investment case bankable — and under what conditions?
- ? How does the category align with the SDGs, enzyme biosafety and process-claim substantiation?

WHY ANMD — THE DIFFERENCE

Most market studies stop at tonnes and revenue. This report is built as a sustainability due diligence instrument — fusing market sizing with ESG, SDG, climate, carbon-integrity and natural-capital intelligence and a decision-ready bankability verdict in a single architecture.

- **Triangulated sizing** — every market read three ways (value (US\$) and volume (tonnes), with catalytic activity (U/g) as a performance lens) so value, capacity and volume views reconcile rather than conflict.
- **Region-honest forecasting** — Latin America, Africa and the Middle East reported in full, never hidden inside Rest of World, every forecast resolved to the 2025 base year.
- **Integrated evidence base** — company, patent and project databases linked to the analysis, with published-filing patents and FTO treated as an indicator, not a legal conclusion.
- **No-fabrication discipline** — every estimate carries a data-confidence rating and disclosed sources; gaps are flagged for further diligence, never filled with invented numbers.
- **Anti-greenwashing rigour** — SDG-washing and greenwashing screens plus claim-substantiation checks built into the ESG and project analysis.
- **Decision-first structure** — 9 Parts and 53 Chapters culminating in stakeholder playbooks and a clear, conditions-based investment verdict.

WHO SHOULD BUY THIS REPORT

Investors and venture / PE funds, enzyme developers, pharma and fine-chemical manufacturers, flavour-and-fragrance and agrochemical firms, contract manufacturers, policymakers, lenders and ESG teams, plus strategic corporate planners and decision-makers.

Access the Full Report

The complete report delivers all 53 chapters in full, with every sub-heading, country table, company and patent directory, forecast model and due diligence checklist.

Purchase at www.anewmarketdynamics.com · Standard & Premium licences · Single-Site (SSL) and Global-Site (GSL) options at checkout.

Want the Complete Detailed Table of Contents?

This prospectus lists the nine parts and 53 chapters. The complete detailed table of contents — every sub-heading, country table, exhibit, company and patent directory and annex — is available on request to registered users. To receive it, register with your official company email at www.anewmarketdynamics.com. The full detailed table of contents will be sent directly to your registered company email address.