

Global Enzymatic DNA Synthesis Market Size study, by Service, Application (Synthetic Biology, Genetic Engineering), End-use, and Regional Forecasts 2022-2032

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Abstracts

The Global Enzymatic DNA Synthesis Market is valued at approximately USD 0.23 billion in 2023 and is projected to register a robust CAGR of 26.40% over the forecast period 2024-2032. Enzymatic DNA synthesis (EDS), a next-generation approach to constructing oligonucleotides and genes, is redefining the pace, precision, and sustainability of synthetic biology workflows. By harnessing enzymes to assemble DNA in vitro, this innovative technology circumvents the limitations of traditional phosphoramidite chemistry, enabling rapid, scalable, and eco-conscious synthesis of longer DNA sequences with reduced error rates. The rising importance of EDS in accelerating advancements across sectors such as personalized therapeutics, agriculture, and biomanufacturing underscores its transformative role in modern life sciences. As the biological sciences gravitate toward automation, modularity, and high-fidelity systems, enzymatic synthesis is poised to become the backbone of next-generation genomic manufacturing.

The exponential growth trajectory of the enzymatic DNA synthesis market is driven by an expanding array of applications in synthetic biology, genetic engineering, and pharmaceutical research. The surging need for synthetic genes, particularly for the development of vaccines, diagnostics, and genetically engineered cell therapies, is amplifying the demand for cost-effective, environmentally benign, and scalable DNA synthesis platforms. EDS technology offers compelling advantages, such as faster turnaround times, room-temperature operations, and the potential for in situ synthesis. Despite its promising outlook, however, the market faces hurdles related to high initial costs, limited commercial scalability compared to conventional methods, and technical

challenges in maintaining sequence accuracy over longer DNA constructs.

Within the market, oligonucleotide synthesis continues to command a significant share due to its essential role in CRISPR editing, diagnostics, and gene expression studies. Simultaneously, gene synthesis is rapidly gaining traction as researchers seek turnkey solutions for building entire genetic circuits and metabolic pathways. This growing preference for bespoke, application-driven synthesis services is reshaping vendor strategies, with industry leaders racing to develop enzyme-based synthesis kits and platform-as-a-service (PaaS) models. Furthermore, end-use dynamics reveal a broadening customer base, from academic research institutions and biotechnology companies to government labs and industrial biomanufacturers that demand precision, scale, and sustainability.

The proliferation of enzymatic DNA synthesis is further catalyzed by a global shift toward precision biology, where the ability to write and rewrite DNA at will enables breakthroughs in fields ranging from gene therapy to agrigenomics. In synthetic biology, for example, EDS plays a pivotal role in designing modular biosynthetic pathways, constructing artificial chromosomes, and developing novel bio-based materials. Meanwhile, in genetic engineering, the use of enzymatic synthesis is streamlining the development of high-performance microbial strains and transgenic plants. As investment in genomics infrastructure and biotech R&D intensifies, particularly in the wake of the COVID-19 pandemic, enzymatic DNA synthesis is positioned as a disruptive enabler across multiple life science verticals.

Regionally, North America leads the global enzymatic DNA synthesis market, bolstered by the presence of early adopters, substantial funding, and cutting-edge research infrastructure. The United States, in particular, is a hub for synthetic biology innovation, home to key players pioneering EDS technology and scaling up its industrial application. Europe follows closely, driven by high levels of academic-industry collaboration and government-sponsored genomic research in countries like the UK, Germany, and France. The Asia Pacific region, meanwhile, is projected to witness the highest growth rate over the forecast period, fueled by rising biotech investments, a thriving startup landscape in synthetic biology, and national genomics initiatives across China, India, and Japan. Latin America and the Middle East & Africa are also showing promising growth trajectories as awareness of genomics and synthetic DNA applications broadens.

Major market player included in this report are:

DNA Script

Codex DNA, Inc.

Twist Bioscience Corporation

Thermo Fisher Scientific, Inc.

Agilent Technologies, Inc.

Integrated DNA Technologies (IDT)

GenScript Biotech Corporation

Eurofins Genomics

Camena Bioscience

Evonetix Ltd

Touchlight Genetics Ltd

Nuclera Nucleics Ltd

Telesis Bio Inc.

Ansa Biotechnologies

Molecular Assemblies, Inc.

The detailed segments and sub-segment of the market are explained below:

By Service

Oligonucleotide Synthesis

Gene Synthesis

By Application

Synthetic Biology

Genetic Engineering

By End-use

Academic & Government Research Institutes

Biotechnology & Pharmaceutical Companies

Contract Research Organizations

Others

By Region:

North America

U.S.

Canada

Europe

UK

Germany

France

Spain

Italy

Rest of Europe

Asia Pacific

China

India

Japan

Australia

South Korea

Rest of Asia Pacific

Latin America

Brazil

Mexico

Middle East & Africa

Saudi Arabia

South Africa

Rest of Middle East & Africa

Years considered for the study are as follows:

Historical year – 2022

Base year – 2023

Forecast period – 2024 to 2032

Key Takeaways:

Market Estimates & Forecast for 10 years from 2022 to 2032.

Annualized revenues and regional level analysis for each market segment.

Detailed analysis of geographical landscape with Country level analysis of major regions.

Competitive landscape with information on major players in the market.

Analysis of key business strategies and recommendations on future market approach.

Analysis of competitive structure of the market.

Demand side and supply side analysis of the market.

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