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Gene Synthesis Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, By Method (Solid-phase Synthesis, Chip-based Synthesis, PCR-based Enzyme Synthesis), By Service (Antibody DNA Synthesis, Viral DNA Synthesis, Others), By Application (Gene & Cell Therapy Development, Vaccine Development, Disease Diagnosis, Others), By End Use (Biotechnology and Pharmaceutical Companies, Academic and Government Research Institutes, Contract Research Organizations), By Region and Competition, 2020-2030F

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Abstracts

Global Gene Synthesis Market was valued at USD 1.84 Billion in 2024 and is expected to reach USD 2.73 Billion by 2030 with a CAGR of 9.76% during the forecast period. The Gene Synthesis market is a burgeoning sector within the biotechnology industry, characterized by the custom production of artificial DNA sequences. It plays a pivotal role in various fields such as genetic engineering, pharmaceuticals, and synthetic biology. The market's growth is primarily driven by advancements in DNA synthesis technologies, reduced costs, and increasing demand for tailored genetic constructs for research and therapeutic purposes.In January 2022, the U.S. Food and Drug Administration (FDA) granted a second approval to Moderna’s mRNA-based COVID-19 vaccine, Spikevax. This highlighted the critical role of gene synthesis during the pandemic, with the market anticipated to experience further growth.

With applications ranging from vaccine development to gene therapy, the Gene

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Synthesis market is poised for continued expansion as it empowers scientists and researchers to design and construct genes with precision, fostering innovation across multiple domains.

Key Market Drivers

Rising investment in synthetic biology market

The rising investment in the synthetic biology market has emerged as a significant driver for the Gene Synthesis market. Synthetic biology, a multidisciplinary field that combines biology with engineering principles, is experiencing a surge in funding and interest from various sectors, including biotechnology, pharmaceuticals, energy, and agriculture. This investment is fundamentally reshaping the landscape of genetic research and applications, with gene synthesis playing a pivotal role. One key aspect of synthetic biology is the design and construction of novel biological parts, devices, and systems. Gene synthesis is the enabling technology that allows scientists and engineers to create custom DNA sequences with precision. As investment in synthetic biology grows, there is a heightened demand for synthesized genes to build and optimize synthetic biological systems. Researchers are increasingly relying on gene synthesis services to design and produce the genetic components required for their projects, from engineered microbes for biomanufacturing to gene circuits for medical applications.

Moreover, the expansion of synthetic biology into diverse industries such as biomanufacturing, biofuels, agriculture, and healthcare is propelling the Gene Synthesis market forward. Investment in these sectors is driving innovation and driving the need for synthetic genes tailored to specific applications. This symbiotic relationship between synthetic biology and gene synthesis is creating a feedback loop, with each field reinforcing the other's growth. Furthermore, the infusion of capital into synthetic biology startups and research initiatives is fostering technological advancements in gene synthesis. Companies are investing in research and development to improve the efficiency, cost-effectiveness, and automation of gene synthesis processes. These innovations are making gene synthesis more accessible and affordable, attracting a broader range of researchers and industries. In conclusion, the rising investment in the synthetic biology market serves as a powerful catalyst for the Gene Synthesis market. It fuels demand for custom DNA sequences, accelerates innovation in genetic engineering, and supports the development of novel applications across various sectors. As synthetic biology continues to flourish, the Gene Synthesis market is likely to see sustained growth and transformation, unlocking new possibilities in biotechnology and beyond.

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Key Market Challenges

Lack of skilled professionals

The Gene Synthesis market faces a significant challenge in the form of a shortage of skilled professionals, which poses hurdles to its growth and advancement. This scarcity of expertise impacts various facets of the gene synthesis industry and has multifaceted consequences. Firstly, gene synthesis involves intricate molecular biology techniques and a deep understanding of DNA manipulation. Without a sufficient number of skilled professionals, the industry may experience delays in project timelines, reduced efficiency, and increased risk of errors in synthesized DNA sequences. This shortage of expertise can hinder research and development efforts in areas such as drug discovery, genetic engineering, and synthetic biology, where precision and accuracy are paramount.

Moreover, the lack of skilled professionals limits the capacity for innovation and technological advancement within the Gene Synthesis market. Talented scientists and engineers are essential for driving the development of new synthesis methods, automation technologies, and software tools that enhance the efficiency and capabilities of gene synthesis platforms. Without a skilled workforce, the industry may struggle to keep pace with emerging trends and evolving customer needs. Additionally, as the demand for gene synthesis services grows across diverse industries, there is an increased need for professionals who can not only synthesize genes but also design and optimize genetic constructs for specific applications. The shortage of such specialists can constrain the market's ability to provide tailored solutions to researchers and organizations with unique genetic engineering requirements. Furthermore, the Gene Synthesis market relies on a workforce that understands and adheres to strict ethical and biosecurity standards, especially as concerns about misuse of synthesized DNA arise. Skilled professionals are essential for implementing and enforcing these standards to ensure responsible and secure use of gene synthesis services. To address these challenges, efforts are needed to invest in education and training programs that cultivate a new generation of skilled gene synthesis professionals. Collaboration between academic institutions, industry, and regulatory bodies can help bridge the skills gap and foster a workforce capable of driving innovation and responsible use of gene synthesis technologies. In doing so, the Gene Synthesis market can overcome the obstacle posed by the shortage of skilled professionals and continue to thrive in the era of genetic advancement.

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Key Market Trends

Growth in Personalized Medicine

The Gene Synthesis market is experiencing a significant trend driven by the growth of personalized medicine. Personalized medicine involves tailoring medical treatments and interventions to an individual's genetic makeup. This approach requires the development of custom-designed genetic constructs, which is where gene synthesis plays a pivotal role. In January 2024, Twist Bioscience introduced Twist Express Genes, a new service providing high-quality synthetic DNA, including larger DNA preparations of up to 1 milligram, with delivery in as little as five business days.

As personalized medicine gains prominence, the demand for synthesized genes for research, diagnostics, and therapeutic applications surges. Gene synthesis allows the creation of precise genetic tools, such as patient-specific gene therapies, gene editing components, and diagnostic probes. These custom genetic constructs enable healthcare providers to develop treatments that are uniquely suited to an individual's genetic profile, maximizing effectiveness and minimizing adverse effects. The Gene Synthesis market is poised to benefit from this trend, as it becomes an indispensable part of the personalized medicine ecosystem. The ability to rapidly and accurately produce tailored genetic material aligns with the evolving healthcare landscape, offering hope for more effective and personalized medical solutions.

Key Market Players

OriGene Technologies, Inc.

Integrated DNA Technologies, Inc.

ProMab Biotechnologies, Inc.

Thermo Fisher Scientific, Inc.

ProteoGenix, Inc.

Biomatik USA LLC

Twist Bioscience

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Boster Biological Technology

Brooks Automation, Inc.

Genscript Corporation

Report Scope:

In this report, the Global Gene Synthesis Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Gene Synthesis Market, By Method:

Solid-phase Synthesis

Chip-based Synthesis

PCR-based Enzyme Synthesis

Gene Synthesis Market, By Service:

Antibody DNA Synthesis

Viral DNA Synthesis

Others

Gene Synthesis Market, By Application:

Gene & Cell Therapy Development

Vaccine Development

Disease Diagnosis

Others

Gene Synthesis Market, By End Use:

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Biotechnology and Pharmaceutical Companies

Academic and Government Research Institutes

Contract Research Organizations

Gene Synthesis Market, By Region:

North America

United States

Canada

Mexico

Europe

France

United Kingdom

Italy

Germany

Spain

Asia-Pacific

China

India

Japan

Australia

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South Korea

South America

Brazil

Argentina

Colombia

Middle East & Africa

South Africa

Saudi Arabia

UAE

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Gene Synthesis Market.

Available Customizations:

Global Gene Synthesis market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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