

Oligonucleotide Synthesis Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028

<https://marketpublishers.com/r/O95097FBCE28EN.html>

Date: November 2023

Pages: 149

Price: US\$ 2,499.00 (Single User License)

ID: O95097FBCE28EN

Abstracts

The global oligonucleotide synthesis market size reached US\$ 2.7 Billion in 2022. Looking forward, IMARC Group expects the market to reach US\$ 5.5 Billion by 2028, exhibiting a growth rate (CAGR) of 12.6% during 2022-2028. The growing prevalence of genetic diseases among the masses, the development of novel therapeutic strategies, and the widespread adoption of therapies using small interfering RNAs (siRNAs), and antisense oligonucleotides are some of the major factors propelling the market. Oligonucleotide synthesis refers to the process of constructing short DNA or RNA molecules, called oligonucleotides, in a predetermined sequence. These can range from just a few bases to around 200 nucleotides in length. The process is accomplished chemically in a controlled laboratory environment, typically using solid phase phosphoramidite chemistry. In this method, nucleotides are sequentially added to a growing chain, each addition involving a series of chemical reactions. This technology enables scientists to generate custom-made oligonucleotides for various applications including gene synthesis, polymerase chain reaction (PCR), gene editing tools, such as CRISPR-Cas9, and molecular diagnostic tests. Advances in oligonucleotide synthesis have dramatically accelerated research in genomics and molecular biology, underpinning many breakthroughs in medical and biological research. The rising prevalence of genetic diseases among the masses majorly drives the global market. This necessitates the development of novel therapeutic strategies, where oligonucleotide-based therapies play a significant role. For instance, therapies using small interfering RNAs (siRNAs) and antisense oligonucleotides are being investigated and utilized in the treatment of genetic disorders, such as Duchenne muscular dystrophy and spinal muscular atrophy. As such, the growing prevalence of genetic diseases drives the demand on the global level. Along with this, the growth of bioinformatics and data science has a direct impact on the oligonucleotide synthesis

industry. The escalating capacity to analyze large genomic datasets is also positively influencing the market. Therefore, the rising computational capability is driving an increased demand for the synthesis of novel oligonucleotides. Furthermore, oligonucleotides particularly antisense oligonucleotides, have been shown to be effective tools in epigenetic research and therapy, helping to modulate gene expression, which is creating a positive market outlook.

Oligonucleotide Synthesis Market Trends/Drivers:

Rising Demand in the Healthcare and Pharmaceutical Industries

The global demand for personalized medicine and therapeutics is rapidly increasing, leading to an unprecedented expansion in the oligonucleotide synthesis market. These synthesized sequences are integral components in developing targeted therapies for various genetic disorders and diseases, including cancer. Along with this, the advancement of therapeutic oligonucleotides, such as antisense oligonucleotides, aptamers, siRNAs, and immunostimulatory oligonucleotides, is revolutionizing disease treatment by specifically inhibiting or altering gene expression. Furthermore, the synthesis of custom oligonucleotides is fundamental to the production of vaccines, including mRNA-based COVID-19 vaccines, which have proven effective and are now widely used. As pharmaceutical companies and researchers continue to discover novel applications for oligonucleotides in the treatment and prevention of diseases, the demand for oligonucleotide synthesis is poised to rise.

Technological Advancements and Innovation

The steady development and refinement of oligonucleotide synthesis technologies are driving market growth. In addition, innovations in the synthesis process, including high-throughput and automated synthesis systems, have increased the efficiency, accuracy, and scalability of oligonucleotide production. Moreover, developments in bioinformatics and synthetic biology, including DNA sequencing and gene editing (e.g., CRISPR-Cas9), heavily rely on the ability to synthesize oligonucleotides accurately. These advancements allow for the creation of custom sequences with greater complexity and diversity and facilitate rapid prototype testing in synthetic biology, thereby fostering more efficient research and development. These continuous technological advancements and developments are also contributing to the market.

Growing Collaborations and Partnerships

Collaborations and partnerships between pharmaceutical companies, biotechnology firms, and research institutions have become essential drivers in advancing the development and commercialization of oligonucleotide therapies for genetic diseases. These collaborations bring together diverse expertise, resources, and funding, creating a synergistic environment that accelerates the translation of scientific discoveries into practical and effective treatments. Pharmaceutical companies, with their experience in drug development, clinical trials, and regulatory processes, contribute vital expertise to

the collaboration. They have the infrastructure, knowledge, and resources necessary to navigate the complex landscape of drug development and ensure that oligonucleotide therapies meet regulatory standards for safety and efficacy. Their involvement helps streamline the path to commercialization by leveraging existing networks, manufacturing capabilities, and distribution channels.

Oligonucleotide Synthesis Industry Segmentation:

IMARC Group provides an analysis of the key trends in each segment of the global oligonucleotide synthesis market report, along with forecasts at the global, regional and country levels from 2023-2028. Our report has categorized the market based on product, application and end use.

Breakup by Product:

Synthesized Oligonucleotide Products

Reagents

Equipment

Services

Synthesized oligonucleotide products dominate the market

The report has provided a detailed breakup and analysis of the market based on the product. This includes synthesized oligonucleotide products, reagents, equipment, and services. According to the report, synthesized oligonucleotide products represented the largest segment.

The market for synthesized oligonucleotide products in the oligonucleotide synthesis industry is being driven by the ever-increasing demand from pharmaceutical and biotechnological companies for drug discovery and development, especially for personalized medicine and targeted therapeutics. Along with this, the rise in genomics and molecular research, fueled by significant advancements in technologies such as Next Generation Sequencing (NGS) and CRISPR gene-editing, is enhancing the requirement for synthesized oligonucleotides. Additionally, the growth in diagnostic applications of oligonucleotides, such as in PCR and microarray assays for genetic and infectious diseases, is propelling the market forward. The expanding field of epigenetics also represents a key driver, with oligonucleotides playing a crucial role in gene expression studies. Moreover, the increasing prevalence of genetic disorders and the resultant demand for novel therapeutic strategies involving oligonucleotides further accelerates the market growth for synthesized oligonucleotide products.

Breakup by Application:

PCR Primers

PCR Assays and Panels

Sequencing

DNA Microarrays

Fluorescence In-Situ Hybridization (FISH)

Antisense Oligonucleotides

Others

PCR primers dominate the market

A detailed breakup and analysis of the market based on the application has also been provided in the report. This includes PCR primers, PCR assays and panels, sequencing, DNA microarrays, Fluorescence In-Situ Hybridization (FISH), antisense oligonucleotides, and others. According to the report, the PCR primers represented the largest segment.

The demand for PCR primers in the oligonucleotide synthesis industry is driven by the ongoing global health crisis necessitating extensive viral testing, in which PCR is a primary method. Furthermore, the increasing application of PCR in medical diagnostics, forensics, and research to detect genetic mutations and infectious diseases fuels the demand for primers. In the field of genomics and molecular biology, PCR is considered a crucial tool for DNA sequencing, cloning, and genetic manipulation, and this broad utilization further drives the need for PCR primer synthesis. Apart from this, technological advancements in PCR techniques, such as real-time PCR and digital PCR, are also playing a role in boosting demand. Moreover, the growing funding for research in healthcare and life sciences has resulted in expanded use of PCR, thus driving the demand for PCR primers in the overall industry.

Breakup by End Use:

Pharmaceutical and Biotechnology Companies

Hospital and Diagnostic Laboratories

Academic Research Institutes

Academic research institutes dominate the market

The report has provided a detailed breakup and analysis of the market based on the product. This includes pharmaceutical and biotechnology companies, hospital and diagnostic laboratories, and academic research institutes. According to the report, academic research institutes represented the largest segment.

The demand for oligonucleotide synthesis in academic research institutes is driven by a rise in genomics and molecular biology research, particularly studies related to gene expression, genetic disorders, and the development of novel therapeutic strategies. Additionally, advancements in technologies such as Next-Generation Sequencing (NGS) and CRISPR gene-editing, which rely on synthesized oligonucleotides, are stimulating demand. In addition, the rising trend of interdisciplinary studies involving bioinformatics and data science, which necessitate the use of oligonucleotides for data validation, further drives the need. Governmental and institutional funding for genomics and biotechnology research is another major driver, enabling academic institutes to invest in oligonucleotide synthesis for various projects. Academic research institutes, with their focus on fundamental research and discovery, often possess cutting-edge

knowledge and innovative ideas. By partnering with industry, they can translate their scientific findings into practical applications and commercial products.

Breakup by Region:

North America

United States

Canada

Asia-Pacific

China

Japan

India

South Korea

Australia

Indonesia

Others

Europe

Germany

France

United Kingdom

Italy

Spain

Russia

Others

Latin America

Brazil

Mexico

Others

Middle East and Africa

North America exhibits a clear dominance, accounting for the largest oligonucleotide synthesis market share

The report has also provided a comprehensive analysis of all the major regional markets, which include North America (the United States and Canada); Asia Pacific (China, Japan, India, South Korea, Australia, Indonesia, and others); Europe (Germany, France, the United Kingdom, Italy, Spain, Russia, and others); Latin America (Brazil, Mexico, and others); and the Middle East and Africa.

The North American market for oligonucleotide synthesis is propelled by a robust pharmaceutical and biotech industry, with a strong focus on drug discovery and development. The region's emphasis on personalized medicine and targeted therapies further propels this need. Additionally, North America's sophisticated healthcare system with advanced diagnostic capabilities increases the demand for oligonucleotides in

diagnostic assays. The region also hosts numerous top-tier academic and research institutes conducting extensive genomics and molecular biology research, which necessitates oligonucleotide synthesis. Moreover, strong governmental and private sector investment in healthcare and life sciences research, particularly in genomics and personalized medicine, fuels the growth of industry in North America. Moreover, the advancements in delivery systems and formulations for oligonucleotide-based therapeutics in North America demonstrate the region's commitment to pushing the boundaries of innovation in this field. These developments not only contribute to the growth of the market but also have the potential to revolutionize the treatment of various diseases, including genetic disorders, cancers, and rare diseases.

Competitive Landscape:

The global oligonucleotide synthesis market is experiencing significant growth due to the escalating investments in the development of new production facilities, upgrading existing ones, and implementing more efficient production processes. Therefore, Companies are heavily investing in research and development to innovate their offerings, including developing new synthesis techniques, improving the scale and accuracy of synthesis, and creating new types of oligonucleotide products to support various applications in diagnostics, therapeutics, and research. Along with this, companies are entering into strategic collaborations, partnerships, and acquisitions to co-develop oligonucleotide-based drugs, share technology and expertise, or expand into new markets. In addition, the introduction of therapeutics, such as antisense oligonucleotides, siRNAs, and miRNAs, offer new avenues for treating a wide range of diseases, including genetic disorders and cancers is positively influencing the market. Furthermore, key players are offering services for the custom synthesis of oligonucleotides. This allows researchers and developers to order specific oligonucleotide sequences tailored to their needs, which is particularly important in fields like genomics, molecular biology, and personalized medicine.

The report has provided a comprehensive analysis of the competitive landscape in the global oligonucleotide synthesis market. Detailed profiles of all major companies have also been provided. Some of the key players in the market include:

Agilent Technologies Inc.

Biolegio B.V.

Bio-Synthesis Inc

Eurofins Genomics

GenScript

Horizon Discovery Ltd

Integrated DNA Technologies Inc (Danaher Corporation)

Kaneka Eurogentec S.A. (Kaneka Corporation)

LGC Limited

Nitto Denko Avecia Inc (Nitto Denko Corporation)

Thermo Fisher Scientific Inc.

Recent Developments:

In May 2023, GenScript increased the size of its principal manufacturing plant in Zhenjiang, Jiangsu, China for the manufacture of oligonucleotides and peptides. The expansion builds on GenScript's history of providing top-notch oligo and peptides to scientists all across the world for 20 years.

In January 2023, Agilent Technologies Inc. announced to increase its production of therapeutic nucleic acids, also known as oligonucleotides. The initiative is the most recent in a series of investments done by the sector in response to rapid development. At Agilent's plant in Frederick, Colorado, where the installation of a line announced in 2020 is slated to commence operating later this year, the project will add two oligonucleotide production lines.

In February 2022, Kaneka Eurogentec S.A. (Kaneka Corporation) stated that a 25 g batch of mRNA for a US customer had been successfully manufactured at its mRNA synthesis facility. In its present facility in Belgium, Eurogentec's GMP mRNA production service provides in vitro transcription (IVT), purification, quality control, and batch release of GMP material up to 25 g scale.

Key Questions Answered in This Report

1. What was the size of the global oligonucleotide synthesis market in 2022?
2. What is the expected growth rate of the global oligonucleotide synthesis market during 2023-2028?
3. What are the key factors driving the global oligonucleotide synthesis market?
4. What has been the impact of COVID-19 on the global oligonucleotide synthesis market?
5. What is the breakup of the global oligonucleotide synthesis market based on the product?
6. What is the breakup of the global oligonucleotide synthesis market based on the application?
7. What is the breakup of the global oligonucleotide synthesis market based on end use?
8. What are the key regions in the global oligonucleotide synthesis market?
9. Who are the key players/companies in the global oligonucleotide synthesis market?

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