

Europe Activated Carbon Market By Type (Powdered Activated Carbon (PAC), Granular Activated Carbon (GAC), Extruded or Pelletized Activated Carbon), By Application (Gas Purification, Water Purification, Metal Extraction, Medicine, and Other), By Country, Competition, Forecast and Opportunities, 2019-2029F

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Abstracts

Europe Activated Carbon Market was valued at USD 3.82 billion in 2023 and is anticipated to project robust growth in the forecast period with a CAGR of 5.38% through 2029. The activated carbon market in Europe is witnessing substantial growth, driven by increasing awareness of environmental concerns, stringent regulations on air and water quality, and the expanding applications of activated carbon in various industries. Activated carbon, a highly porous carbonaceous material with an extensive internal surface area, is widely used for adsorption and purification purposes in several industries. Its ability to remove contaminants from air, water, and gases makes it a crucial component in environmental protection, water treatment, and various industrial processes.

Stringent regulations imposed by European governments and the European Union (EU) on air and water quality, emission control, and waste management have created a significant demand for activated carbon in pollution control applications. The need for safe drinking water and the treatment of wastewater in compliance with regulatory standards are driving the use of activated carbon in water treatment plants, which is a major driver for the market.

The increasing awareness of indoor air quality and the need for removing volatile organic compounds (VOCs) and odors in commercial and residential buildings have



fueled the use of activated carbon in air purification systems. The pharmaceutical and medical industries are adopting activated carbon for drug purification, kidney dialysis, and the treatment of poisonings, contributing to market growth.

Activated carbon prices can be subject to fluctuations in the prices of raw materials, especially coal and coconut shells, affecting manufacturers and end-users alike. Sustainability concerns and the need for responsibly sourced raw materials have created challenges for the activated carbon industry.

Eastern European countries are witnessing increased demand for activated carbon, presenting untapped market opportunities for industry players. Tailoring activated carbon products to meet specific industry needs, such as food and beverage, automotive, and pharmaceuticals, can lead to new growth avenues.

The adoption of regeneration and recycling processes for activated carbon is gaining momentum, offering sustainable alternatives, and reducing operational costs. The development of bio-based activated carbon, derived from sustainable sources such as agricultural waste, is an emerging trend aligning with eco-friendly initiatives.

The incorporation of nanotechnology into activated carbon production is enhancing its adsorption capacity and effectiveness in various applications. The use of digital technologies for monitoring and optimizing activated carbon usage in industrial processes is on the rise, leading to improved efficiency and cost savings.

The Europe activated carbon market is experiencing robust growth, primarily driven by environmental regulations, water treatment needs, air purification demands, and expanding industrial applications. Challenges related to price volatility and sustainable sourcing are being addressed through innovations in material sourcing and production processes. Emerging trends such as regeneration and recycling, bio-based activated carbon, nanotechnology integration, and digitalization are shaping the future of the industry. To capitalize on these opportunities, industry stakeholders should focus on sustainable practices, customization, and the development of advanced activated carbon products to meet the evolving needs of various sectors. As the importance of environmental protection and pollution control continues to rise, activated carbon is poised to play a pivotal role in addressing these challenges across Europe.

Key Market Drivers



Growing demand From Water Treatment Sector is major factor for Europe Activated Carbon Market Growth

The Europe activated carbon market is experiencing notable growth, largely driven by the growing demand from the water treatment sector. Activated carbon, a versatile adsorbent material with a wide range of applications, has become a crucial component in addressing water quality and purification challenges across Europe.

One of the key factors fueling the growth of the activated carbon market in Europe is the increasing need for effective water treatment solutions. Clean and safe drinking water is a fundamental requirement for public health and environmental sustainability. Europe, with its stringent water quality standards and regulations, relies on advanced water treatment technologies to ensure the delivery of potable water to its population. Activated carbon's exceptional adsorption properties make it highly effective in removing a myriad of waterborne contaminants, including organic compounds, chlorine, pesticides, and heavy metals. This capability aligns with the region's commitment to providing its citizens with access to high-quality drinking water, thereby driving the demand for activated carbon in the water treatment sector.

The European Union's focus on environmental protection and sustainability has played a pivotal role in boosting the adoption of activated carbon in water treatment applications. Activated carbon is considered an environmentally friendly solution, as it can be derived from renewable sources such as wood, coconut shells, and other organic materials. This aligns with the EU's broader sustainability goals and its efforts to reduce carbon emissions and promote eco-friendly practices in various sectors. As a result, activated carbon has become the material of choice for water treatment processes across Europe, facilitating compliance with stringent environmental regulations.

The presence of aging water infrastructure in many European countries has led to the release of pollutants into water sources, necessitating advanced treatment methods. Activated carbon, through its adsorption capabilities, plays a crucial role in mitigating the impact of these contaminants. Whether it's the removal of organic compounds, disinfection byproducts, or emerging contaminants like pharmaceuticals and personal care products, activated carbon provides an effective and reliable solution for water treatment facilities.

The increasing awareness of the potential health risks associated with water contaminants, such as lead, arsenic, and emerging pollutants, has further fueled the



demand for activated carbon in Europe's water treatment sector. Consumers and regulatory authorities alike are recognizing the importance of safeguarding water quality to protect public health. As a result, there is a growing emphasis on upgrading and expanding water treatment infrastructure, which includes the integration of activated carbon-based filtration and purification systems. Additionally, technological advancements and innovations in activated carbon production methods have contributed to the market's growth. European manufacturers have been investing in research and development to improve the quality and efficiency of activated carbon production, resulting in enhanced performance and cost-effectiveness. These innovations have led to a wider range of activated carbon products tailored for specific water treatment applications, further driving market expansion.

The growing demand from the water treatment sector is a major driving force behind the growth of the activated carbon market in Europe. The region's commitment to providing safe and clean drinking water, coupled with its environmental sustainability initiatives, positions activated carbon as a vital component in addressing water quality challenges. As Europe continues to modernize and upgrade its water treatment infrastructure to meet the demands of a growing population and stricter regulations, the activated carbon market is poised for sustained growth and continued innovation in water purification technologies.

Rising Demand for Pharmaceutical and Medical Applications Drives the Demand for Europe Activated Carbon Market

The Europe activated carbon market is experiencing significant growth, primarily propelled by the rising demand for pharmaceutical and medical applications. Activated carbon, a versatile adsorbent material known for its exceptional purification capabilities, has become indispensable in the healthcare and pharmaceutical sectors across Europe.

One of the primary factors fueling the growth of the activated carbon market in Europe is the stringent quality standards and regulations governing pharmaceutical and medical products. The European pharmaceutical industry is known for its strict adherence to safety and quality standards to ensure the efficacy and safety of medicines and medical devices. Activated carbon plays a vital role in meeting these standards by providing a reliable means of purification and separation during the manufacturing process. It is used for the removal of impurities, colorants, and contaminants from pharmaceutical intermediates and final products, ensuring that medications meet the highest quality and safety criteria.



Activated carbon's role in medical applications extends beyond pharmaceutical manufacturing. It is widely employed in medical devices and filtration systems designed to improve patient care and safety. Activated carbon filters are used in respiratory equipment to remove airborne contaminants and ensure clean air delivery to patients, especially those with respiratory conditions. Moreover, activated carbon is used in water purification systems within healthcare facilities to provide clean and safe water for medical procedures and patient consumption. In this context, the reliability and effectiveness of activated carbon are crucial for safeguarding the health and well-being of patients.

The increasing awareness of environmental pollutants and their potential impact on health has also driven the demand for activated carbon in medical and pharmaceutical settings. Europe's commitment to environmental sustainability aligns with the use of activated carbon as an eco-friendly solution for removing contaminants. The material's ability to adsorb volatile organic compounds (VOCs), hazardous chemicals, and toxins makes it a valuable tool in environmental protection and indoor air quality enhancement, both within healthcare facilities and pharmaceutical manufacturing plants.

The pharmaceutical industry's continuous expansion and innovation have led to an increased need for activated carbon in research and development. As pharmaceutical companies develop new drugs and therapies, they require activated carbon for various purposes, including purification of research reagents, chromatography, and the removal of impurities from drug formulations. This growth in pharmaceutical research and development activities further drives the demand for activated carbon in Europe.

Technological advancements and innovations in activated carbon production methods have played a pivotal role in market growth. European manufacturers have invested in research and development to improve the quality, consistency, and adsorption capacities of activated carbon products. These advancements have led to tailored activated carbon solutions optimized for specific pharmaceutical and medical applications, further enhancing the material's utility in these sectors.

The rising demand for pharmaceutical and medical applications is a major driver of growth in the Europe activated carbon market. The material's crucial role in ensuring the quality, safety, and purity of pharmaceutical products and medical devices, along with its contributions to environmental protection and research activities, positions it as a key component of the healthcare and pharmaceutical industries in Europe. As these sectors continue to evolve and expand, activated carbon is expected to maintain its prominence



and play an increasingly vital role in supporting healthcare and pharmaceutical advancements while adhering to stringent quality and safety standards.

Increasing Awareness of Indoor Air Quality and the Need for Removing Volatile Organic Compounds (VOCs)

The Europe activated carbon market is witnessing substantial growth, driven by the increasing awareness of indoor air quality (IAQ) and the critical need to remove volatile organic compounds (VOCs) from indoor environments. Activated carbon, a highly effective adsorbent material, has emerged as a key solution in addressing the challenges associated with IAQ, making it a sought-after product across various sectors in Europe.

One of the primary factors fueling the growth of the activated carbon market in Europe is the growing concern over indoor air pollution. With people spending a significant portion of their lives indoors, the quality of the air they breathe has a direct impact on their health and well-being. The presence of VOCs in indoor environments, which can originate from various sources such as paints, adhesives, cleaning products, and furnishings, poses health risks and can lead to respiratory problems, allergies, and other adverse health effects. As a result, there is a heightened awareness of the importance of maintaining clean and healthy indoor air, which has led to increased demand for activated carbon-based air purification systems.

Stringent regulations and standards related to indoor air quality have been implemented across Europe, driving the adoption of activated carbon solutions. Governments and environmental agencies are imposing limits on VOC emissions and indoor air pollutant levels to protect public health. Activated carbon, with its exceptional adsorption capacity for VOCs and other indoor air contaminants, provides an effective means of complying with these regulations. This has led to the integration of activated carbon filtration systems in various settings, including residential buildings, offices, schools, healthcare facilities, and industrial workplaces.

The commercial and industrial sectors in Europe have also recognized the importance of maintaining clean indoor air to ensure the health and productivity of employees. Activated carbon-based air purification systems are increasingly being incorporated into HVAC (heating, ventilation, and air conditioning) systems to remove VOCs and airborne pollutants, creating healthier and more productive work environments. Additionally, industries with processes that generate VOC emissions, such as manufacturing and chemical production, are utilizing activated carbon adsorption technologies to meet



emission reduction requirements and minimize their environmental impact.

The trend toward sustainable and eco-friendly solutions has further boosted the demand for activated carbon in IAQ applications. Activated carbon is derived from renewable sources, such as coconut shells, wood, and peat, making it an environmentally responsible choice for air purification. This aligns with Europe's commitment to reducing its carbon footprint and promoting sustainable practices in various sectors, including IAQ management.

Technological advancements and innovations in activated carbon production methods have played a significant role in market growth. European manufacturers have invested in research and development to enhance the performance and efficiency of activated carbon products. These innovations have led to the development of specialized activated carbon formulations designed to target specific VOCs and indoor air contaminants, further increasing the material's effectiveness in IAQ applications.

The increasing awareness of indoor air quality and the need to remove VOCs from indoor environments are driving the demand for activated carbon in Europe. The material's exceptional adsorption capabilities, alignment with regulatory requirements, and eco-friendly nature make it a vital tool in ensuring clean and healthy indoor air across residential, commercial, and industrial settings. As Europe continues to prioritize IAQ management and sustainability, the activated carbon market is poised for sustained growth and innovation in air purification technologies.

Key Market Challenges

Sustainable Sourcing

Sustainable sourcing has become a critical factor obstructing the growth of the global Tow Prepreg market. Tow Prepreg, a composite material comprising carbon fibers and resin, is valued for its exceptional strength-to-weight ratio and versatility in various industries, including aerospace and automotive. However, the demand for sustainable and eco-friendly materials has intensified, and consumers, industries, and regulators are increasingly scrutinizing the environmental impact of production processes.

The carbon fiber industry, a key component of Tow Prepreg, often relies on resource-intensive processes that involve the use of energy and raw materials, which can be environmentally taxing. As a result, companies are under growing pressure to source carbon fibers responsibly, minimize waste, and reduce their carbon footprint.



This emphasis on sustainability poses a challenge to the Tow Prepreg market, as it necessitates investments in eco-friendly manufacturing practices and materials sourcing. Manufacturers must adapt to these demands by adopting sustainable sourcing strategies and promoting transparency in their supply chains to align with the global push for environmentally responsible solutions. Meeting these sustainability standards will be crucial to unlocking future growth opportunities in the Tow Prepreg market.

Fluctuations in the Prices of Raw Materials

Fluctuations in the prices of raw materials are presenting a significant hurdle to the growth of the global Tow Prepreg market. Tow Prepreg, a composite material composed of carbon fibers and resin, relies heavily on the availability and cost of its constituent materials. Carbon fibers, in particular, are a key component and often a major cost driver in Tow Prepreg production.

The prices of carbon fibers are susceptible to fluctuations due to various factors, including changes in supply and demand dynamics, shifts in production technologies, and market forces. These price variations can impact the overall cost structure of Tow Prepreg manufacturing, making it challenging for companies to provide consistent and competitive pricing to their customers.

The uncertainty associated with raw material prices can disrupt supply chains, hinder long-term planning, and create financial instability within the industry. To mitigate these challenges, companies in the Tow Prepreg market must implement effective supply chain management strategies, explore alternative materials or sources, and develop resilient pricing models to adapt to fluctuating raw material costs. This adaptability will be essential for sustaining growth and competitiveness in this dynamic market.

Key Market Trends

Regeneration and Recycling

In the Europe activated carbon market, regeneration and recycling have emerged as key trends that are shaping the industry's growth trajectory. Activated carbon, known for its excellent adsorption properties, plays a vital role in air and water purification, as well as in various industrial processes. However, sustainability and environmental concerns are driving the demand for more eco-friendly practices within the industry.



Regeneration of activated carbon involves restoring its adsorption capacity after it has become saturated with contaminants. This process allows activated carbon to be reused multiple times, reducing the need for disposal and minimizing the environmental impact. It also leads to cost savings for end-users, which is particularly appealing in Europe's competitive market.

Recycling is another crucial trend, where spent activated carbon is reprocessed to recover valuable components or to create new adsorbents. This not only reduces waste but also conserves resources. The European Union's stringent environmental regulations and carbon neutrality goals have further accelerated the adoption of recycling and regeneration practices in the activated carbon industry.

The circular economy principles promoted in Europe emphasize the importance of extending the lifespan of products and materials. This has led to increased investments in research and development to improve regeneration and recycling technologies, making them more efficient and cost-effective.

As sustainability becomes a top priority for both consumers and industries in Europe, companies in the activated carbon sector are focusing on greener and more sustainable solutions. By embracing regeneration and recycling, the Europe activated carbon market is not only aligning with environmental goals but also positioning itself for long-term growth in a region committed to reducing its carbon footprint and environmental impact.

Development of Bio-Based Activated Carbon

The development of bio-based activated carbon is a prominent trend driving innovation and growth in the Europe activated carbon market. As sustainability and environmental consciousness continue to gain momentum in the region, there's a growing emphasis on finding eco-friendly alternatives to traditional activated carbon production methods, which often involve non-renewable resources and energy-intensive processes.

Bio-based activated carbon is derived from renewable biomass sources, such as agricultural residues, wood chips, coconut shells, and even algae. These feedstocks are considered more environmentally sustainable because they are readily available and do not contribute to deforestation or rely on fossil fuels. The utilization of biomass for activated carbon production aligns with Europe's commitment to reducing carbon emissions and promoting circular economy principles.



Bio-based activated carbon offers excellent adsorption properties and can be tailored to specific applications, making it a versatile and viable alternative to conventional activated carbon. Its use spans across air and water purification, gas storage, and various industrial processes.

The European Union's stringent environmental regulations and initiatives to achieve carbon neutrality have accelerated the adoption of bio-based activated carbon in the region. As a result, companies in the activated carbon sector are investing in research and development to optimize production processes and create high-performance bio-based activated carbon products. This trend not only addresses sustainability concerns but also enhances the market's competitiveness by offering environmentally responsible solutions. With bio-based activated carbon gaining traction in Europe, it is poised to play a significant role in shaping the future of the activated carbon industry in the region while contributing to a more sustainable and greener economy.

Segmental Insights

Type Insights

Based on the type, the Granular Activated Carbon (GAC) segment emerged as the fastest growing segment in the European market for activated carbon in 2023. GAC is known for its versatility and effectiveness in a wide range of applications, including water and wastewater treatment, air purification, and gas phase adsorption. In a diverse market like Europe, where various industries and municipalities require activated carbon for different purposes, GAC's adaptability makes it a preferred choice. Water treatment is a significant application for activated carbon in Europe due to stringent water quality regulations and the need to remove contaminants like organic chemicals, disinfection byproducts, and heavy metals. GAC's large surface area and porous structure excel in adsorbing these impurities, making it a primary choice for water treatment facilities.

The demand for activated carbon in municipal water treatment plants and industrial processes is substantial in Europe. GAC is favored by both municipalities and industries for its efficiency in removing pollutants, ensuring compliance with environmental regulations, and maintaining product quality. GAC has a long history of successful use in activated carbon applications, and its performance is well-established. This track record instills confidence among users and decision-makers, leading to its continued dominance in the market.



Regional Insights

Germany stand out as the dominant consumer of adhesives and sealants in the European region, and several key factors contribute to its leading position. This growth is primarily driven by escalating water treatment activities, particularly in the northern region of the country, leading to a surge in the demand for activated carbon. Germany's water supply and wastewater treatment sectors collectively contribute approximately USD 23.6 billion annually to the market.

Germany is actively transitioning towards green energy sources while reducing its reliance on nuclear, oil-fired, coal-fired, and natural gas-fired power plants. Notably, the nation has committed to decommissioning all 17 of its atomic energy facilities by the close of 2022.

Activated carbon plays a pivotal role in the production of lithium-ion batteries, widely used in electronic devices, including electric vehicles (EVs). When employed as an electrode material in a battery, activated carbon enhances energy storage capabilities. Its high surface area facilitates the attachment of lithium ions, thus increasing the battery's capacity for energy storage. Additionally, Germany's pharmaceutical exports, according to the UN Comtrade database, reached USD 126 billion by the end of 2022, marking a notable 5.6% increase from the previous year when exports amounted to USD 119.27 billion. Germany stands as the second-largest pharmaceutical exporter in Europe, following the United Kingdom. Notably, the United States serves as the primary non-European destination for the majority of German pharmaceutical exports. Considering these factors, Germany is poised to assert its dominance in the European region within the market under consideration. The country's proactive approach towards environmental sustainability, coupled with its robust presence in the EV and pharmaceutical sectors, positions it as a key player shaping the industry landscape in Europe.

Key Market Players

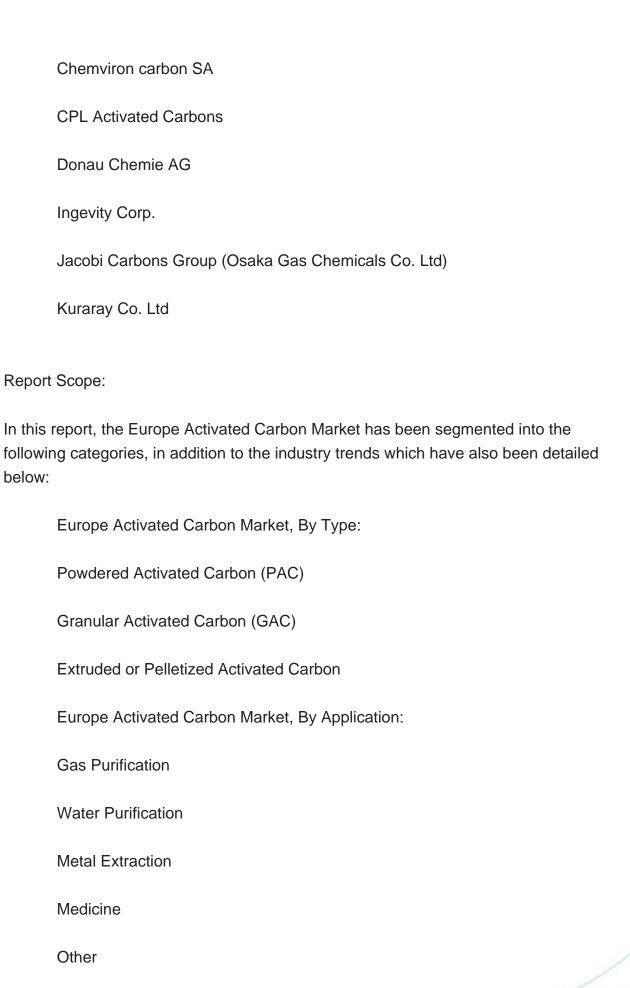
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Albemarle Corporation

Carbon Activated Corporation

CarboTech AC Gmbh







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Europe Activated Carbon 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).



Contents

1. PRODUCT OVERVIEW

- 1.1. Market Definition
- 1.2. Scope of the Market
 - 1.2.1. Markets Covered
 - 1.2.2. Years Considered for Study
 - 1.2.3. Key Market Segmentations

2. RESEARCH METHODOLOGY

- 2.1. Objective of the Study
- 2.2. Baseline Methodology
- 2.3. Key Industry Partners
- 2.4. Major Association and Secondary Applications
- 2.5. Forecasting Methodology
- 2.6. Data Triangulation & Validation
- 2.7. Assumptions and Limitations

3. EXECUTIVE SUMMARY

- 3.1. Overview of the Market
- 3.2. Overview of Key Market Segmentations
- 3.3. Overview of Key Market Players
- 3.4. Overview of Key Regions/Countries
- 3.5. Overview of Market Drivers, Challenges, Trends

4. IMPACT OF COVID-19 ON EUROPE ACTIVATED CARBON MARKET

5. VOICE OF CUSTOMER

6. EUROPE ACTIVATED CARBON MARKET OUTLOOK

- 6.1. Market Size & Forecast
 - 6.1.1. By Value & Volume
- 6.2. Market Share & Forecast
- 6.2.1. By Type (Powdered Activated Carbon (PAC), Granular Activated Carbon (GAC), Extruded or Pelletized Activated Carbon)



- 6.2.2. By Application (Gas Purification, Water Purification, Metal Extraction, Medicine, and Other)
 - 6.2.3. By Region
 - 6.2.4. By Company (2023)
- 6.3. Market Map

7. FRANCE ACTIVATED CARBON MARKET OUTLOOK

- 7.1. Market Size & Forecast
 - 7.1.1. By Value & Volume
- 7.2. Market Share & Forecast
 - 7.2.1. By Type
 - 7.2.2. By Application

8. GERMANY ACTIVATED CARBON MARKET OUTLOOK

- 8.1. Market Size & Forecast
 - 8.1.1. By Value & Volume
- 8.2. Market Share & Forecast
 - 8.2.1. By Type
 - 8.2.2. By Application

9. UNITED KINGDOM ACTIVATED CARBON MARKET OUTLOOK

- 9.1. Market Size & Forecast
 - 9.1.1. By Value & Volume
- 9.2. Market Share & Forecast
 - 9.2.1. By Type
 - 9.2.2. By Application

10. ITALY ACTIVATED CARBON MARKET OUTLOOK

- 10.1. Market Size & Forecast
- 10.1.1. By Value & Volume
- 10.2. Market Share & Forecast
 - 10.2.1. By Type
 - 10.2.2. By Application

11. SPAIN ACTIVATED CARBON MARKET OUTLOOK



- 11.1. Market Size & Forecast
 - 11.1.1. By Value & Volume
- 11.2. Market Share & Forecast
 - 11.2.1. By Type
- 11.2.2. By Application

12. MARKET DYNAMICS

- 12.1. Drivers
- 12.2. Challenges

13. MARKET TRENDS AND DEVELOPMENTS

- 13.1. Recent Developments
- 13.2. Product Launches
- 13.3. Mergers & Acquisitions

14. EUROPE ACTIVATED CARBON MARKET: SWOT ANALYSIS

15. PRICING ANALYSIS

16. PORTER'S FIVE FORCES ANALYSIS

- 16.1. Competition in the Industry
- 16.2. Potential of New Entrants
- 16.3. Power of Suppliers
- 16.4. Power of Customers
- 16.5. Threat of Substitute Application

17. PESTLE ANALYSIS

18. COMPETITIVE LANDSCAPE

- 18.1. Kureha Corporation
 - 18.1.1.1. Business Overview
 - 18.1.1.2. Company Snapshot
 - 18.1.1.3. Applications & Services
 - 18.1.1.4. Financials (In case of listed companies)



- 18.1.1.5. Recent Developments
- 18.1.1.6. SWOT Analysis
- 18.2. Albemarle Corporation
- 18.3. Carbon Activated Corporation
- 18.4. CarboTech AC Gmbh
- 18.5. Chemviron Carbon SA
- 18.6. CPL Activated Carbons
- 18.7. Donau Chemie AG
- 18.8. Ingevity Corp.
- 18.9. Jacobi Carbons Group (Osaka Gas Chemicals Co. Ltd)
- 18.10. Kuraray Co. Ltd

19. STRATEGIC RECOMMENDATIONS

20. ABOUT US AND DISCLAIMER



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