

# **Global Activated Carbon Market By Type (Powdered, Granular, Others), By Raw Material (Wood, Coconut Shells, Coal, and Others), By End User (Water Treatment, Food & Beverage, Pharmaceutical, Automotive, Air Purification, Others), By Region, By Competition Forecast & Opportunities, 2018-2028F**

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## **Abstracts**

The Global Activated Carbon Market achieved a valuation of USD 7.68 billion in 2022 and is poised for robust growth in the forecast period, with a projected Compound Annual Growth Rate (CAGR) of 7.51% through 2028. The market is expected to reach USD 11.75 billion by 2028. Activated carbon, a processed form of carbon with small, low-volume pores, is renowned for its increased surface area, enabling effective chemical reactions and adsorption. It is produced through the processing of organic materials rich in carbon content. The primary attribute of activated carbon is its remarkable physical adsorption capability, proving invaluable across various applications, including purification, decaffeination, metal finishing, medicine, filtration, pollutant removal, and fuel storage. Both the liquid and gaseous phases of activated carbon contribute to its effectiveness in removing contaminants like lead, dissolved radon, mercury, and compounds responsible for unpleasant odors.

### **Key Market Drivers**

1. **Rise in Utilization of Activated Carbon in Water Treatment:** A significant driving force behind the market's expansion is the growing utilization of activated carbon in water treatment applications. Clean and safe drinking water is an essential global requirement, and with increasing population growth, industrial activities, and pollution levels, ensuring access to clean water has become a pressing challenge. This has led

to a rising demand for efficient water treatment solutions capable of removing contaminants and impurities from water sources. Activated carbon, with its exceptional adsorption capabilities, has emerged as a highly effective tool in water treatment processes. Its broad usage can be attributed to its ability to adsorb organic compounds, chemicals, and pollutants found in water. It effectively eliminates impurities like chlorine, pesticides, heavy metals, and volatile organic compounds (VOCs), thus enhancing the quality and safety of drinking water. The utilization of activated carbon in water treatment not only improves the taste and odor of water but also eliminates potential health risks associated with various contaminants. The increased awareness of waterborne diseases and the adverse effects of contaminated water on public health have led to a heightened focus on water quality. Governments and regulatory bodies worldwide have implemented stringent regulations regarding water quality standards, necessitating the removal of specific pollutants and contaminants from wastewater before its discharge into the environment or reuse. Activated carbon's superior adsorption properties make it an ideal choice for meeting these regulatory requirements. Advances in water treatment technology have led to the development of more efficient and cost-effective activated carbon filtration systems, expanding the application areas of activated carbon in water treatment.

2. Growing Demand for Activated Carbon in the Pharmaceutical Industry: Activated carbon, with its highly porous nature and substantial surface area, finds extensive use in the pharmaceutical industry. Its exceptional adsorption properties make it an indispensable component in various pharmaceutical processes, including purification, decolorization, deodorization, and impurity removal. Activated carbon plays a pivotal role in purifying raw materials, including active pharmaceutical ingredients (APIs), excipients, and solvents. It effectively eliminates impurities such as colorants, odors, heavy metals, and residual chemicals, thereby augmenting the purity and safety of pharmaceutical products. As regulations become more stringent, the demand for activated carbon in drug purification processes is anticipated to escalate. Activated carbon is utilized in pharmaceutical manufacturing to eradicate toxic substances and contaminants from APIs and intermediates. It acts as a potent adsorbent, eliminating trace impurities that may prove detrimental or compromise the efficacy of drugs. The growing emphasis on product safety and regulatory compliance propels the demand for activated carbon in the pharmaceutical industry. The industry is progressively embracing sustainable practices to mitigate its environmental impact. Activated carbon, being a natural and renewable resource, aligns well with these sustainability goals. Its employment in solvent recovery processes aids in waste reduction and minimizes the environmental footprint of pharmaceutical manufacturing. The focus on sustainable practices within the industry further amplifies the demand for activated carbon.

## Key Market Challenges

1. **Volatility in Prices of Raw Materials:** The production of activated carbon relies on specific raw materials such as wood, coconut shells, coal, and other organic substances. These raw materials undergo a process called activation, which creates a highly porous structure with an increased surface area. The quality, availability, and cost of these raw materials significantly influence the production costs and market dynamics of activated carbon. Price volatility in raw materials can result in imbalances between supply and demand, leading to fluctuations in the availability of activated carbon. Shifts in supply can disrupt manufacturing processes and create uncertainties in meeting customer demands. Moreover, sudden price increases or shortages of raw materials may prompt manufacturers to seek alternative sources or substitute materials, affecting product quality and consistency. Fluctuating raw material prices directly impact the cost structure of activated carbon manufacturing. When raw material prices rise, manufacturers face higher production costs, which can lead to reduced profit margins if they are unable to pass on these costs to customers. On the other hand, when raw material prices decline, manufacturers may struggle to maintain profitability, especially if they have already made significant investments at higher prices. Price volatility in raw materials influences the pricing strategies adopted by activated carbon manufacturers. When raw material prices surge, manufacturers may be compelled to increase product prices to maintain profitability. However, this could potentially affect their competitiveness in the market, as customers may seek lower-cost alternatives or explore different adsorbent options. Balancing cost pressures with maintaining a competitive edge can be challenging for manufacturers. Price volatility makes long-term planning and forecasting difficult for activated carbon manufacturers, hindering investment decisions, capacity expansions, and business growth strategies as manufacturers must carefully assess the risks associated with raw material price fluctuations.

2. **Stringent Environmental Regulations:** Governments worldwide have enacted stringent environmental regulations in response to growing concerns about pollution and climate change. These regulations set standards for emissions, waste management, and the use of potentially harmful substances. The activated carbon industry, like many others, must comply with these regulations to ensure sustainable and environmentally responsible operations. Stringent environmental regulations require industries to invest in technologies and processes that minimize their environmental impact. For activated carbon manufacturers, this means adopting cleaner production methods, implementing advanced emission control systems, and ensuring proper waste disposal. These

measures often come with high upfront costs and ongoing expenses, which can strain the financial resources of smaller manufacturers and potentially limit market entry. Environmental regulations are subject to continuous updates and revisions. As governments become more aware of emerging pollutants and new risks, they adjust the regulatory framework accordingly. This constant evolution poses challenges for activated carbon manufacturers, who must stay updated and compliant with changing requirements. Failure to meet these evolving standards can result in fines, penalties, or even the suspension of operations. Stricter environmental regulations may require activated carbon manufacturers to meet specific performance criteria, such as higher removal efficiencies for pollutants or reduced emissions. Meeting these requirements may necessitate changes in production processes or the development of new formulations. Manufacturers must invest in research and development to ensure their products remain effective while complying with environmental regulations, which can add complexity and costs to the production process. Complying with stringent environmental regulations can impact the competitiveness of activated carbon manufacturers on a global scale. Companies that fail to meet regulatory standards may face restrictions or bans on their products, limiting their market access. Additionally, manufacturers located in regions with less stringent regulations may enjoy cost advantages due to lower compliance costs, creating an uneven playing field for companies operating in different jurisdictions.

## Key Market Trends

- 1. Growth in Technological Advancements:** The global activated carbon market has witnessed significant growth in recent years, driven by its diverse applications in water treatment, air purification, and industrial processes. One of the key trends shaping this market is the rapid growth in technological advancements. Innovations in production processes, product design, and application techniques have revolutionized the activated carbon industry, enabling enhanced performance and efficiency. Technological advancements have led to the development of more efficient and sustainable manufacturing processes for activated carbon. Traditional methods, such as physical activation and chemical activation, have been enhanced through automation and optimization. New techniques, such as microwave activation and carbonization, offer faster production rates, higher yields, and improved product quality, thereby driving market growth. Innovations in product design have resulted in the development of activated carbon with tailored properties and improved performance characteristics. Researchers are exploring new materials and formulations to optimize surface area, pore size distribution, and adsorption capacity. These advancements enable activated carbon to effectively remove volatile organic compounds (VOCs), heavy metals, and

other contaminants from air and water sources, expanding its range of applications. The integration of nanotechnology into the production of activated carbon has opened up new possibilities for improved performance. Nanoparticles, such as graphene and carbon nanotubes, can enhance the adsorption capacity and selectivity of activated carbon. Additionally, composite materials combining activated carbon with polymers or other substances offer enhanced mechanical strength, stability, and regeneration capabilities. Technological advancements have allowed for the customization of activated carbon products to suit specific applications. For instance, activated carbon impregnated with metal oxides or catalysts can be used for gas purification or catalytic reactions. Furthermore, advancements in manufacturing techniques have facilitated the production of activated carbon in various forms, including pellets, granules, fibers, and powdered forms, to cater to different process requirements. The implementation of digital technologies and automation systems has streamlined production processes and improved overall efficiency. Real-time monitoring and control systems optimize resource utilization, reduce energy consumption, and enhance product quality. Automation also enables manufacturers to meet stringent environmental regulations by ensuring precise dosing and minimizing waste generation during production.

## Segmental Insights

### Type Insights:

In 2022, the powdered activated carbon (PAC) segment dominated the activated carbon market and is expected to continue expanding in the coming years. Powdered Activated Carbon (PAC) exhibits remarkable adsorption capacity, making it suitable for diverse treatment objectives and effective removal of various particulates. The demand for PAC has surged in the coal-fired utility industry for mercury removal, prompting companies like Cabot Corporation to augment their activated carbon production capacity to meet this high demand.

### End User Insights:

In 2022, the water treatment segment led the activated carbon market and is projected to continue expanding in the foreseeable future. The global demand for water treatment technology is on the rise, with numerous companies innovating and developing new technologies for water treatment and recycling. The implementation of standards requiring companies to adopt efficient water disposal techniques and use environmentally friendly compounds is expected to further support market growth.

## Regional Insights:

The Asia Pacific region has established itself as the leader in the Global Activated Carbon Market. It serves as a lucrative market for coconut shell procurement and coconut shell-based activated carbon. Activated carbon finds extensive application in water purification and gold mining sectors in this region. Among the countries in Asia Pacific, Indian dry coconuts are preferred due to their superior oil content. Key market players like Jacobi Carbons and Haycarb source coconut shells from Asian countries such as Sri Lanka, Indonesia, the Philippines, and India. These industry leaders maintain a strong presence in the Asia Pacific region and actively invest in organic growth through joint ventures and licensing agreements.

## Key Market Players

Calgon Carbon Corporation

Cabot Corporation (CBT)

Kuraray Co., Ltd.

CarboTech AC GmbH

ADA Carbon Solutions, LLC

Indo German Carbons Limited

Oxbow Activated Carbon LLC

Donau Chemie AG

CECA SA

Hayleys PLC

## Report Scope:

In this report, the Global Activated Carbon Market has been segmented into the following categories, in addition to the industry trends which have also been detailed

below:

Global Activated Carbon Market, By Type:

Powdered

Granular

Others

Global Activated Carbon Market, By Raw Material:

Wood

Coconut Shells

Coal

Others

Global Activated Carbon Market, By End User:

Water Treatment

Food & Beverage

Pharmaceutical

Automotive

Air Purification

Others

Global Activated Carbon Market, By Region:

North America

Asia Pacific

Europe

Middle East & Africa

South America

### Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Activated Carbon Market.

### Available Customizations:

Global Activated Carbon Market report with the given market data, Tech Sci 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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