

AI in Chemicals Market by Component (Hardware, Software (by Type, Technology, and Deployment Mode) and Services), Business Application, End User (Basic Chemicals, Active Ingredients, and Paints & Coatings) and Region - Global Forecast to 2029

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Abstracts

The global AI in chemicals market is valued at USD 0.7 billion in 2024 and is estimated to reach USD 3.8 billion in 2029, registering a CAGR of 39.2% during the forecast period. Optimizing chemical processes with AI-enabled solutions serves as a potential driver for accelerating the adoption of AI in the chemical sector. As more than 80% of chemical companies now prioritize sustainability alongside revenue growth, AI emerges as a crucial tool for achieving these goals. Notably, in 2022, two-thirds of companies actively developing AI strategies reported significant increases in both productivity and sustainability achievements. AI-powered predictive models offer precise recommendations for formulations and manufacturing processes, advancing sustainability objectives while significantly improving return on investment. Companies implementing AI strategies have witnessed notable cost reductions of up to 30% and impressive decreases of 20% in greenhouse gas emissions within their chemical workflows. Successful integration of AI relies on robust data foundations and effective training strategies. Ensuring data diversity and quality is paramount to maintaining accuracy and preventing model drift, safeguarding against suboptimal predictions and investments. Through enriched datasets and curated training sets, companies validate AI models, unlocking new insights and breakthroughs.

“By component, the software segment is projected to hold the largest market size during the forecast period.”

The AI landscape in the chemicals market is multifaceted, encompassing a diverse

range of various software solutions tailored to specific industry needs. These software solutions are categorized by type, including dashboard and analytics tools that enable real-time data visualization and strategic decision-making, process simulation software that aids in modeling and optimizing chemical processes, chemical modeling software for molecular design and analysis, laboratory management software for efficient lab operations, virtual screening tools for drug discovery and materials design, and chemical property prediction tools for predicting material properties and behavior. This software is further categorized by advanced technologies such as machine learning, deep learning, generative AI, natural language processing (NLP), computer vision, and advanced analytics. Moreover, these softwares are deployed across different modes, including cloud-based solutions for scalability, flexibility, and accessibility, as well as on-premises deployments for data security, control, and compliance. This diverse software ecosystem forms the foundation for AI-driven innovation, optimization, and transformative advancements in the chemicals industry.

“By Business Application, R&D is registered to grow at the highest CAGR during the forecast period.”

The chemical sector is undergoing a significant transformation driven by the rapid adoption of artificial intelligence (AI) technologies. This shift is propelled by the need for more efficient and sustainable research and development (R&D) processes. In November 2022, Chemical.AI, a Shanghai-based R&D AI technology firm, secured USD 14 million in Series B funding. Chemical.AI specializes in harnessing AI and automation to create an intelligent chemical synthesis platform, thereby boosting research efficacy in chemistry and streamlining drug discovery processes. Initiatives such as the collaboration between Eastman and NC State's Department of Chemical and Biomolecular Engineering exemplify this trend by leveraging AI, catalysis, and robotics to create self-driving labs. By automating labor-intensive tasks and accelerating compound discovery and property prediction, AI optimizes R&D processes, leading to more sustainable and efficient manufacturing of specialty chemicals. Additionally, companies such as Quantistry, with its advanced cloud-native simulation platform integrating Quantum and AI technologies, are further revolutionizing chemical research and development. Their focus on sustainability and efficiency, coupled with quantum-based simulations and AI-driven insights, enables innovative materials' optimization, discovery, and design.

“Asia Pacific is projected to witness the highest CAGR during the forecast period.”

The Asia Pacific region is experiencing a transformative shift in the chemicals industry

due to the integration of artificial intelligence technologies. Countries such as China and Japan are leading this transformation with robust investments in AI research, development, and implementation across the chemical value chain. China, being the largest chemicals market, is leveraging AI for process optimization, predictive maintenance, and supply chain management, driving efficiency and cost savings. Japan's chemical industry, renowned for its innovation, is adopting AI for product development, quality control, and sustainability initiatives, contributing to its global competitiveness. India's rapidly growing chemical sector is embracing AI for smart manufacturing, safety enhancements, and environmental sustainability, supported by government initiatives and private investments. South Korea, with its focus on AI research and development, is fostering AI-driven innovations in chemical production processes, driving technological advancements and market competitiveness.

Breakdown of primaries

In-depth interviews were conducted with Chief Executive Officers (CEOs), innovation and technology directors, system integrators, and executives from various key organizations operating in the AI in chemicals market.

? By Company: Tier I: 35%, Tier II: 45%, and Tier III: 20%

? By Designation: C-Level Executives: 35%, Directors: 25%, and Others: 40%

? By Region: North America: 40%, Europe: 20%, Asia Pacific: 30%, Middle East & Africa: 5%, Latin America: 5%

Major vendors offering AI in chemicals hardware, software and services across the globe are IBM (US), Microsoft (US), Schneider Electric (France), AWS (US), Google (US), SAP (Germany), NVIDIA (US), C3.ai (US), GE Vernova (US), Siemens (Germany), Hexagon (Sweden), Engie Impact (US), TrendMiner (Belgium), Xylem (US), NobleAI (US), Iktos (France), Kebotix (US), Uptime AI (US), Canvass AI (Canada), Nexocode (Poland), SandboxAQ (US), Deepmatter (England), Zapata AI (US), Citirne Informatics (US), Chemical.AI (China), Augury (Israel), Intellegens (UK), Ripik.AI (India), Tractian (US), Polymerize (Singapore), ScienceDesk (Germany), OptiSol Business Solutions (India), NuWater (Africa) and VROC (Australia).

Research Coverage

The market study covers AI in chemicals across segments. It aims at estimating the

market size and the growth potential across different segments, such as component (hardware, software [by type, technology, and, deployment mode] & services), business application, end users, and region. It includes an in-depth competitive analysis of the key players in the market, along with their company profiles, key observations related to product and business offerings, recent developments, and key market strategies.

Key Benefits of Buying the Report

The report would provide the market leaders/new entrants in this market with information on the closest approximations of the revenue numbers for the overall market for AI in chemicals and its subsegments. It would help stakeholders understand the competitive landscape and gain more insights to position their business and plan suitable go-to-market strategies. It also helps stakeholders understand the pulse of the market and provides them with information on key market drivers, restraints, challenges, and opportunities.

The report provides insights on the following pointers:

Analysis of key drivers (Growing demand of AI for research & development, Rising demand for AI-enhanced chemical process optimization), restraints (High cost associated with AI implementation in chemical industry, Regulatory constraints posing obstacles to scalability of AI solutions in chemical sector), opportunities (Growing demand for AI-based predictive maintenance, Growing integration of generative AI to unlock unprecedented opportunities), and challenges (Issues related to converting chemical data into machine-readable data, Lack of skilled workforce) influencing the growth of the AI in chemicals market

Product Development/Innovation: Detailed insights on upcoming technologies, research & development activities, and new product & service launches in the AI in chemicals market.

Market Development: Comprehensive information about lucrative markets – the report analyses the AI in chemicals market across varied regions.

Market Diversification: Exhaustive information about new products & services, untapped geographies, recent developments, and investments in AI in chemicals market strategies; the report also helps stakeholders understand the pulse of the AI in chemicals market and provides them with information on key

market drivers, restraints, challenges, and opportunities.

Competitive Assessment: In-depth assessment of market shares, growth strategies and service offerings of leading players such as IBM (US), Microsoft (US), Google (US), Schneider Electric (France), SAP (Germany) among others in the AI in chemicals market.

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