

Green Chemistry in Pharmaceutical Synthesis: Sustainable Strategies for Drug Production

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Abstract: *The world is shifting from traditional synthetic or chemical technologies towards greener methods due to increasing concerns about maintaining a clean and sustainable environment. The development of eco-friendly products through processes that support environmental sustainability is referred to as a "green approach." In the pharmaceutical industry, there is growing attention to green synthesis of chemicals and materials, both in research and applied science, because green chemistry eliminates harmful processes and materials while promoting innovation in drug and therapeutic agent development. Green chemistry encompasses chemical reactions that minimize environmental impact and reduce toxicity. This field is rapidly evolving within pharmaceutical synthesis, focusing on the creation of sustainable medicines. This review explores the principles and practical applications of this innovative strategy within the pharmaceutical sector. By using environmentally friendly chemical processes, green chemistry reduces hazardous materials and pollution. Its aim is to mitigate the environmental footprint of drug production without compromising the quality and effectiveness of medicines. The approach also emphasizes the use of renewable and sustainable resources, such as shifting from petrochemical-based to bio-based feedstocks, allowing pharmaceutical companies to reduce their greenhouse gas emissions.*

Keywords: Green chemistry, eco-friendly synthesis, sustainable chemistry, environmental stewardship, atom efficiency, pharmaceutical sector, green engineering, hazardous solvents, biocatalysis, waste minimization