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A Review on Green Chemistry

Pallavi B Sadgir*,Bharat L Patel ,Pratikshamhaske And Pallavi L phalke
Matorhri Radha Collge of Pharmacy, VirgaonAkole.

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ABSTRACT
Green chemistry is an approach to the design, manufacture and use of chemical products to intentionally reduce or eliminate chemical hazards. It focuses on the reduction, recycling/ elimination of the use of toxic and hazardous chemicals in production processes by finding creative, alternative routes for making the desired products that minimize the impact on the environment. Sustainable economic growth requires safe, sustainable resources for industrial production. This article describes an introductory account of the basic tanets on which the concept of the Green Chemistry is based.
Green chemistry which is the latest and one of the most researched topics now days has been in demand since 1990's. Majority of research in green chemistry aims to reduce the energy consumption required for the production of desired product whether it may be any drug, dyes and other chemical compounds. It aims to reduce or even eliminates the production of any harmful bi-products and maximizing the desired product without compromising with the environment.The goal of green chemistry (GC) is the design (or redesign) of products and manufacturing processes to reduce their impact on human health and the environment. Fundamental to the GC concept is the idea of sustainability – reducing environmental impacts and conserving natural resources for future **Green**generations.Although many of the principles of green chemistry are not new, the extent to which they have been organized into a coherent approach and the degree to which they are being applied have resulted in an intensified attention on this topic among the academic, industrial, and regulatory communities.
Key words: Green chemistry, History, Scope, Source, Importance, Application in industries Introduction

Green chemistry is a science-based philosophy of designing chemicals, products, and processes with the intention of making them less hazardous and more sustainable.

The accelerated progress In science and technology now a days has led to economic development in world, but such economic development also cause environmental degradation which is manifested by climate change, the issue of ozone holes and accumulation of non destructive organic pollutant in all parts of biospheres. Green chemistry is new branch of chemistry involves pulling together tools
Chemistry as a separate discipline took its shape in the beginning of 17th century also referred to as "age of reason". Since then the properties and use of different compounds has fascinated many Scientist.

Definition

Green chemistry, also called sustainable chemistry, is an area of chemistry and chemical engineering focused on the design of products and processes that minimize or eliminate the use and generation of hazardous substances. It is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances.Green chemistry is the process of

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thinking about and applying current knowledge to lessen the negative environmental impact of pollution.

History

The term green chemistry was first given by Poul .T. Anastas in 1991 in special program launched by the US environmental Protection Agency (EPA) to implement sustainable development in chemistry ,chemical technology by industry ,academia and government. Green chemistry emerged from a variety of existing ideas and research efforts in the period leading up to the 1990s, in the context of increasing attention to problems of chemical pollution and resource depletion. Idea of green chemistry was initially developed as a response to the Pollution Prevention Act of 1990

Scope

This focus area involves designing and implementing a novel, green pathway to produce a new or existing chemical substance. Chemistry plays an important and useful role towards the development and growth of a number of industries.

Green Chemistry provides a unique forum for the publication of innovative research on the development of alternative green and sustainable technologies.

Green Chemistry is at the frontiers of this continuously-evolving interdisciplinary science and publishes research that attempts to reduce the environmental impact of the chemical enterprise by developing a technology base that is inherently non-toxic to living things and the environment. Submissions on all aspects of research relating to the endeavour are welcome.

Need of Green chemistry

Green chemicals either degrade to innocuous products or are recovered for further use. Plants and animals suffer less harm from toxic chemicals in the environment. Lower potential for global warming, ozone depletion, and smog formation. Less chemical disruption of ecosystems.Green chemistry looks at pollution prevention on the molecular scale and is an extremely important area of Chemistry due to the importance of Chemistry in our world today and the implications it can show on our environment.

The Green Chemistry program supports the invention of more environmentally friendly chemical processes which reduce or even eliminate the generation of hazardous substances.Green CHEMISTRY is undeniably a very prominent part of our daily lives

Green Chemistry looks at pollution prevention on the molecular and larger scale.

Ii program supports the invention of more environmentally friendly chemical processes which reduce or even eliminate the generation of hazardous substances.Chemistry is a very prominent part of our daily lives.Chemistrdevllopments also bring new environmental problems and harmful unexpected side effects, which result in the need for ‘greener’ chemical products.

Importance

Green chemicals either degrade to innocuous products or are recovered for further use. Plants and animals suffer less harm from toxic chemicals in the environment.One of the key principles of green chemistry is to reduce the use of derivatives and protecting groups in the synthesis of target molecules.

Green Chemistry has many applications are our day-to-day life. Following are the uses of green Chemistry-It is used in the process of coating, consumer products, pharmaceuticals, preservatives, etc.Dry cleaning of clothes- In the early years, we used tetrachloroethylene as a solvent for dry cleaning. This compound is carcinogenic and also pollutes the groundwater. Green chemistry means designing chemical products and processes that use and produce fewer or no polluting or hazardous materials. For example, you could use green chemistry in developing new catalysts or substitutes for volatile organic compounds used in solvents and adhesives.

- DESIGN SAFER CHEMICALS & PRODUCTS
- USE RENEWABLE FEEDSTOCKS
- USE CATALYSTS,NOT STOICHOMETRIC REAGENTS
- MAXIMIZE ATOM ECONOMY

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- INCREASE ENERGY EFFICIENCY
- DESIGN CHEMICALS & PRODUCTS TO DEGRADE AFTER USE
- ANALYZE IN REAL TIME TO PREVENT POLLUTION
- MINIMIZE THE POTENTIAL FOR ACCIDENTS.

Principal of Green chemistry

The principles of green chemistry speak about the reduction or removal of dangerous or harmful substances from the synthesis.Green chemistry is basically a proactive approach aimed at designing asynthesis/process in a sustainable way right from the beginning. synthesis/process in a sustainable way right from the beginning.

- **Less hazard**. Synthetic methods should, where practicable, use or generate materials of low human toxicity and environmental impact.
- **Safer chemicals**. Chemical product design should preserve efficacy whilst reducing toxicity.
- **Safer solvents**. Avoid auxiliary materials – solvents, extractants – if possible, or otherwise make them innocuous.
- **Energy efficiency.** Energy requirements should be minimized: conduct synthesis at ambient temperature and pressure.
- **Renewable feedstocks**. Raw materials should, where practicable, be renewable.
- **Reduce derivatives.** Unnecessary derivatization should be avoided where possible.
- **Smart catalysis**. Selectively catalyzed processes are superior to stoichiometric processes.
- **Degradable design.** Chemical products should be designed to be degradable to innocuous products when disposed of and not be environmentally persistent.
- **Waste prevention**: Avoiding the creation of garbage products is always better than cleaning up waste after it has been formed.
- **Atom economy:** The synthetic procedures and methods used in green chemistry must always strive to optimize the consumption and incorporation of all raw materials into the end product.Design synthetic methods to maximize incorporation of all material used into final product.
- **Incorporation of safe chemistry for accident prevention**: When building chemical processes, it is critical to ensure that the compounds employed in the processes are safe to use.
- **Avoiding the production of hazardous chemicals:** reactions and processes that entail the synthesis of certain toxic compounds that are detrimental to human health must be optimized to avoid the production of such substances.
- **Real-time analysis for pollution prevention.** Monitor processes in real time to avoid excursions Waste prevention: Avoiding the creation of garbage products is always better than cleaning up waste after it has been formed.eading to the formation of hazardous materials.
- **Hazard and accident prevention**. Materials used in a chemical process should be chosen to minimize hazard and risk for chemical accidents, such as releases, explosions, and fires.
- **Designing chemicals for degradation:** When developing a chemical product to perform a certain purpose, attention must be given throughout the design process to ensure that the chemical is not an environmental contaminant.

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- **Real-time analysis:** Procedures and analytical techniques must be developed to the point where they can provide real-time data for monitoring. This allows the persons involved to halt or regulate the process before toxic/dangerous compounds are generated.

Application

- Textile and Tannery Industry oDesigning Safer Chemicals ProductioWaste minimization in drug discovery oDesigning Safer Chemicals Production oPolymer industry oFood and Industry
- Green Technologies in the Pharmaceutical Industry oGreen Chemistry in Agrochemicals oWaste minimization in drug discovery

Industrial Application of green chemistry

Green Chemistry is not a lab-curiosity; instead it aims at big objective of creating a sustainable tomorrow. Increasing number of green methodologies developed by academic and industrial researchers enables companies to commercialize these ideas. Industry, from small businesses to large corporations, has already made strategic moves towards sustainability by adopting the principles of green chemistry. The development of less hazardous processes and commercial products, the shift from inefficient chemical routes towards bio-based synthesis, and the replacement of oil-based feed stocks by renewable starting materials are only a few examples of the major decisions taken that will ultimately have vast consequences for the world chemical markets.Chemical manufacturers used green chemistry to reduce or eliminate their use of TRI solvent and reagent chemicals.

involves major chemicals, reagents, solvents, catalysts and almost all types of organic reactions for synthesis of active pharmaceutical substances. Therefore, many chemicals and chemical processes involved are hazardous, toxic and may show adverse effects on human health and environment. Pharmaceutical companies can influence and improve the environmental performance with utilizing green chemistry. Green chemistry is being employed to develop revolutionary drugdelivery methods that are more effective and less toxic and could benefits of patients. Green chemistry has grown from a small idea into a new approach to the scientifically based environmental protection. By using green chemistry procedures, we can minimize the waste of materials, maintain the atom economy and prevent the use of hazardous chemicals. Researchers and pharmaceutical companies need to be encouraged to consider the principles of green chemistry while designing the processes and choosing rreagent.

Now that sustainability is on everybody's top-of-mind, Green Chemistry is more important than ever.

Just think about the amount of industries that rely on chemistry and whose activity has a great impact on the environment: pharma, agriculture, colorants, materials, consumer products.

Use Green Chemistry has many applications are our day-to-day life. Following are the uses of green Chemistry-It is used in the process of coating, consumer products, pharmaceuticals, preservatives, etc.Dry cleaning of clothes- In the early years, we used tetrachloroethylene as a solvent for dry cleaning. This compound is carcinogenic and also pollutes the groundwater. Nowadays, liquefied carbon dioxide with suitable detergent is used for the purpose of dry cleaning. It generates liquid carbon dioxide as a by-product, which is less hazardous and hence causes less pollution.Bleaching of paper-Chlorine gas was used initially for this purpose, but now it has been replaced by hydrogen peroxide.

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Hydrogen peroxide is used along with a suitable catalyst that promotes its bleaching action. It is also used in electronics and in many other electrical devices.Plants and animals suffer less harm from toxic chemicals in the environment. Lower potential for global warming, ozone depletion, and smog formation. Less chemical disruption of ecosystems. Less use of landfills, especially hazardous waste landfills.Replaced by organophosphates, which degrade rapidly in the environment, but are much more toxic to mammals.

Use compounds that destroy only the target organisms. For example, an insecticide that mimics a hormone used only by molting insects; activating the natural defense mechanism against pests or diseases.

REVIEW LITERATURE

The literature of green chemistry has undergone a dramatic increase in the new millennium. Besides that, in ad hoc journals, papers of this type are published in journals of general, organic, and catalytic chemistry. The high proportion of communications within this area indicates that this is a hot topic.

1. Green chemistry is a term that refers to the production of chemical products and processes that reduce the use of and production of harmful substances.
2. Green chemistry aims to reduce or even eliminates the production of any harmful biproducts and maximizing the desired product without compromising with the environment
3. This is caused mainly due to the use of harmful reactants and effect of by-product of chemical iindustries, which are being discharge into air, rivers and the land, but by applying the concept of green chemistry these all problems can be reduced

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