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Recent trends and principles in green chemistry

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Abstract:

Green chemistry for chemical combinationaddress our future challenges in functioning with chemical process and products by invent novel reactions that can maximize the products and minimize by-products, designing new synthetic schemes that are seeking greener solvents and environmentally benevolent. Green chemistry is the operation of a set of principles that will help reduce the use and generation of hazardous substances during the manufacture and application of chemical a brief description on green chemistry and its developments and some industrial applications are discussed. Green chemistry has appeared in the United States as a common program resulting from interdisciplinary cooperation of university teams, independent research groups, industry, scientific societies and governmental agencies, own programs devoted to decreasing pollution.

It's important to note that the scope of these of green chemistry and engineering principles goes beyond concerns over hazards from chemical toxicity and includes energy conservation, waste reduction. Green chemistry incorporate a new approach to the combination, processing and application of chemical as to reduce intimidation to health and the environment. A trend in Green Chemistry explores to their knowledge base in using green chemistry ispreserving the environment. This provides an opportunity to show their creativity in the practice of sustainability in the fields of physical chemistry, organic chemistry, biochemistry, geochemistry, physics, engineering and other allied areas to helpknowledge and ease practice of green chemistry.

Green Chemistry is a new trend to design safer chemicals and processes. It minimizes the negative impact of chemicals on the human health & environment and helps in achieve sustainability in the chemical production. The need of chemists to make products that are effective and economical extended the scope of Green Chemistry.

Key Words: Green Chemistry, Principles, Design, Environment, Pollution, Sustainability, Hazards.

Introduction:

The idea of greening chemistry developed in the business and regulatory community as a natural development of pollution prevention initiative. To improve crop protection, commercial products and medicines, we also caused not deliberate harm to our planet and humans. Green chemistry takes the EPA's permission a step further and creates a new reality for chemistry and engineering by asking chemists and engineers to design chemicals, chemical processes and commercial products in a way that, at the very least, avoids the creation of toxics and waste.

Green chemistryand Sustainable in very simple terms is just a different way of thinking about how chemistry and chemical engineering can be done. Over the years different principles have been proposed that can be used when idea about the design, development and implementation of chemical products and processes. These principles allow scientists and engineers to protect and help the economy, people and the planet by finding creative and novel ways to reduce waste, conserve energy, and discover replacements for hazardous substances. Green chemistry can also be defined through the use of metrics. While a unified set of metrics has not been established, many ways to quantify greener processes and products have been proposed. These metrics include ones for mass, energy, hazardous substance reduction or elimination, and life cycle environmental impact.

Chemists will play a key role in the realization of the conditions for a sustainable development and green chemistry may be their approach. Green chemistry addresses such challenges by inventing novel reactions that can maximize the desired products and minimize by-products, designing new synthetic schemes that can simplify operations in chemical productions and seeking greener solvents that are naturally environmentally and ecologically benign.

Result and Discussion:

The objective of green chemistry is the design of products and manufacturing processes to reduce their impact on human health and the environment. The basic concept to the green chemistry is the idea of sustainability – reducing environmental impacts and conserve natural resources for future generation. Although many of the principles of green chemistry are not new, the scope to which they have been planned into a logical approach and the degree to which they are being applied have resulted in an intensifyconsideration on this topic among the academic, industrial, and regulatory communities.

More specifically, green chemistry is the design of chemical products and process that are more environmentally benign. Green and sustainable chemistry, a new idea that arise, gained wider importance and support only at the turn of the millennium. Green and sustainable chemistry concern the development of processes and technologies that result in more efficient chemical reactions that createslight waste and less environmental emission than "traditional" chemical reactions do.

Green chemistry encompasses all aspects and types of chemical process that decrease negative impact to human health and the environment relative to the recent state-of-the-art practices. By reducing or eliminating the use or generation of hazardous substances associated with a particular synthesis or process, chemists can greatly reduce risks to both human health and the environment. Green chemistry concept is aimed at encouragement and development of future sustainable ways of life in which guiding principles and trends of green chemistry are observed not only for their basic settlement to the environment or health but also to advance new technologies/sciences, generations, and jobs. Green chemistry avoids pollution by utilize environmentally benign processes and novel products, which are "benign by design." Through the various main trends of green chemistry, including biocatalysts, renewable feedstock, new synthetic pathway, and reaction medium/environment, the dual aims of economic help and environmental protection could be achieved. Most important among the essential changes is the demands of shifting the energy production and chemical production from a fossil resource to a renewable biomass or bioenergy feedstock. Based on the concepts and principles of green chemistry, this chapter provides a general idea of the greener chemical processes/products, future potentials, and prevailing trends in the conversion of residues into important biomaterials.

The Green chemistry approach, in contrast with traditional practice, targets hazardreduction. This is a safer approach because, if hazard is eliminating in the first place, there is no way hazard can increase through any unexpected spontaneous exposure increase anywhere downstream. Traditionally, in industry and society, the reduction of hazard is achieved through the reduction of exposure. By description of toxicity data and knowing the value of the exposure controls containing the hazard,can be manipulated, particularly the chemical chain, when it is easy to recognize and measure. However, exposure controls may be not as useful downstream. The farther the hazard is from its resource, the less the awareness of the possible hazard. Green chemistry is the need of today and future which gives a valuable idea for the scientifically based environmental safety. Chemists, researchers and pharmaceutical companies must be use to consider the principles of green chemistry while designing the reaction mechanism and selecting catalyst. By applying green chemistry procedures, we can minimize the waste materials, reduce the use of toxic chemicals, maintain the atom economy and save the environment which is heritage of our next generation. To combine the technological progress with the safeguard of the environment is one of the challenges of the new millennium. Green chemistry involves a reduction in, or elimination of, the use of hazardous substances in a chemical process or the generation of hazardous or toxic intermediates or products. This includes feedstock, reagents, solvents, products, and by-product. It also include the use of sustainable raw material and energy sources for this manufacturing process

Green chemistry incorporate a new approach to the combination, processing and application of chemical as to decreaseintimidation to health and the environment. Green chemistry takes into account the environmental impact and seeks to prevent or lessen that impact through several key principles outlined below.

1. **Prevention**: It is better to prevent waste formation than treating or cleaning up waste after it is formed.
2. **Design synthetic methods:** DesignSynthetic methods should try to maximize the incorporation of all materials used in the process into the final product.
3. **Fewer hazards**: Synthetic methods should, where feasible, avoid using or generating substances toxic to humans and/or the environment.
4. **Designing safer chemicals**: Chemical products should be designed to attain their desired function while being as non-toxic as possible.
5. **Safer solvents**: Auxiliary substances should be avoided wherever possible and as non-hazardous as possible when they must be used.
6. **Design forEnergy efficiency:** Energy requirements should be minimized, and processes should be conduct at ambient temperature and pressure.
7. **Use ofRenewable feedstock**: Whenever it is useful to do so, renewable feedstock or raw materials are preferable to non-renewable.
8. **Reduce derivatives**: Avoidableproduction of derivatives—such as the use of protecting groups—should be minimized or avoided if possible; such steps require other reagents.
9. **Smart catalysis**:Catalytic reagents that can be used in small quantities to repeat a reaction are better to stoichiometric reagents that are consumed in a reaction.
10. **Degradable design**: Chemical products should be designedto be degradable so that they do not pollute the environment; when their function is complete, they should break down into non-harmful products.
11. **Real-time analysis for pollution prevention**: Analytical methodologies need to be developed to allow real-time, in-process monitoring and control to the formation of hazardous materials**.**
12. **Hazard and accident prevention**. Whenever possible, the substances in a process, and the forms of those substances, should be chosen to minimize risks such as explosions, fires, and accidental releases.

Twelve principles of green chemistry should be obeyed, and these principles can manage the researchers to improve productivity and reduce hazardous effects on human health.The twelve principles address a range of ways to reduce the environmental and health impact of chemical production, and also designate research priority for the development of green chemistry technologies.

The principles face such concepts as:

- the design of processes to maximize the amount of raw material that ends up in the product;
- the use of renewable material feedstock and energy sources;
- the use of safe, environmentally benign substances, including solvents;
- the design of energy efficient processes;
- avoiding the production of waste, which is viewed as the perfect form of waste management.

Green chemistry is aninteresting research area due to its respect to environment and usefulness for more purified organic compounds, which will be active pharmaceuticals. Active pharmaceutical ingredients (API) should have adequate purity due to their use in human health. Any toxic waste coming from adopted protocols can influence the product. These disadvantages increase further purification protocols. All these disadvantages can be dropped using green chemistry principles.

Around the world, pharmaceutical industries give to do green protocol due to human health and product costs. These aims led them to find out new and greener synthetic protocols that can be utilized on an industrial scale. These protocols are very important and can be transferred in research and development, which have been progressed in the university or other industries.

Conclusion:

Green chemistry has been recently described in the chemistry education that detail course content, student assessments, and educationalmethod. Current trends in education research and practice have traditional the importance of necessary knowledge and the value of high-impact practices, active learning, and comprehensive teaching. The green chemistry principles are also important for designing metrics for chemical technology. Green chemistry is seen as a powerful device that researchers must use to evaluate the environmental impact of nanotechnology. There is a trend of nano-material technology in the practice.

Green chemistry is the design of chemical products and processes that decrease or remove the use and formation of hazardous chemicals. Therefore, green chemistry practices are proposed to provide economic and

environmental. Finally, textbooks, journals, supplemental materials, websites, and institutions that have tools for green chemistry educators are presented.

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