International Journal of Management, IT & Engineering
Vol. 8 Issue 10, October 2018,
ISSN: 2249-0558
Impact Factor: 7.119Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

A Brief study of Green Chemistry

Dr. Subrata Naiya, Assistant Professor,
Sushil Kar College, Champahati, Baruipur, West Bengal
Email: subratanaiya.naiya@gmail.com

Abstract

The term 'Green Chemistry' is a branch of chemistry which expresses how chemicals of daily needs are produced by using such existing knowledge that neither use toxic chemicals nor emits polluting chemicals into the atmosphere. Thus, it helps in reducing the chemicals hazards along with development activities in environment. This article contains a basic idea about green chemistry.

Key words: Green Chemistry, toxic, Hazards, Chemicals

Introduction

Green chemistry is also known as sustainable chemistry. In 1989, Paul Anastas and John Warner, who defined green chemistry as 'the design of chemical products and process that reduce or eliminate use or generation of hazardous substances' [1]. Green chemistry gives an idea about chemical products and processes that reduce or eliminate the use or generation of hazardous substances [2-3]. It applies across the life cycle of a chemical product, including its design, manufacture, use, and ultimate disposal [2,4].

Chemical developments in various field like medicinal, agrochemical and polymer science etc, bring a new environmental threats and unexpected harmful side effects which is manifested by climate change, the ozone layer depletion and accumulation of nonbiodegradable organic pollutant in all parts of atmosphere, land and sea [5-7]. So, Chemist and Chemical engineers have a new challenge to make pollution free and friendly environment, which result in the need for greener chemical products. Green chemistry looks at pollution preventions at molecular scale and is an extremely important area of the chemistry due to importance of

Chemistry in our world today [8-9]. During the past decade special emphasis has been made towards green synthesis which circumvents the above problems. Green chemistry is now going to be a vital role in the field of synthetic chemistry [10-11].

Need for Green Chemistry:

The basic needs of green chemistry is to protect and benefit the economy, people and the planet by finding unique and innovative ways to reduce waste, conserve energy, and discover replacements for hazardous substances[1-4]. Hence, there is an essential need to improve the synthetic and engineering chemistry either by environmental friendly starting materials or by properly designing novel synthesis routes that reduce the use and generation of toxic substances by using modern energy sources [2-4].

Goals of Green Chemistry

Goals of Green chemistry are –

i. To design and produce cost-competitive processes and chemical products that Plants and animals suffer less harm from toxic chemicals in the environment.

ii. To lower potential for global warming, ozone depletion, and smog formation.

iii. To make less chemical disruption of ecosystems.

iv. To make less use of landfills, especially hazardous waste landfills.

Twelve Principles of Green Chemistry

Paul T. Anastas and John C. Warner developed the Twelve Principles of Green Chemistry in 1991. These principles can be grouped into "Reducing Risk" and "Minimizing the Environmental Footprint" [12 - 14]. The twelve principles of green chemistry are

1. The chemical processes should be optimised to produce the minimum amount of waste possible.

2. Synthetic methods should be modified to maximize the incorporation of all materials used in the process into the final product**.**

3. Synthetic methods should be designed to use and generate substances that possess little or no

toxicity to human health and the environment.

4. Chemical products should be designed to affect their desired function while minimizing their toxicity.

5. The use of secondary substances (e.g., solvents, separation agents, etc.) should be made unnecessary wherever possible and innocuous when used.

6. Energy requirements of chemical processes should be recognized for their environmental and economic impacts and should be minimized. If possible, synthetic methods should be conducted at ambient temperature and pressure.

7. The raw material should be renewable rather than depleting whenever technically and economically practicable.

8. Unnecessary derivatization (use of blocking groups, protection/ deprotection, temporary modification of physical/chemical processes) should be minimized or avoided if possible, because such steps require additional reagents and can generate waste.

9. Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.

10. Chemical products should be designed so that at the end of their function they break down into innocuous degradation products and do not persist in the environment.

11. Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.

12. Substances and the form of a substance used in a chemical process should be chosen to minimize the potential for chemical accidents, including releases, explosions, and fires.

Disadvantages of green Chemistry

Although green chemistry opens a new path to make threat less and pollution free environment but there are several possible disadvantages of green processes and technology [15-16]. These are

i. High implementing costs,

ii. Lack of information

iii. Lack of green solutions for some process

iv. Lack of effective metrics to track green chemistry impacts

iv. Uncertainty about performance

Conclusion

This article gives a basic idea about green chemistry. The green chemistry helps us in designing new methods to synthesize the desired product economically, environment friendly and it also helps to avoid the utilization of the toxic chemicals leading to various hazards in the industry. The Green Chemistry, a research topics will not only enables us to expand our knowledge but it would also help to protect the environment.

References

1. Anastas. P.T, Warner J.C, Green chemistry Theory and Practice, Oxford University, Press, New York, 1998.

2. "Green chemistry". United states environmental protection agency 2006-06-28. Retrieved 2011-03-23

3. Singhal M., Singh A. Khan S.P, Green Chemistry Potential for Past, Present and Future Perspectives, 2012; 3(4).

4. Anastas P.T, Hovarsth I.T, Innovations and Green Chemistry, Chemistry review, 2007; 107.5.

5. Mehta, A. and Hawkins, 'Integrated Pollution Control and its Impact: Perspectives from Industry', Journal of Environmental Law, 10(1), 1998, pp.65.

6. Armin Rosencranz, Shyam Divan and Martha L. Noble, Environmental Law and Policy in India – Cases, Material and Statutes, 1991

7. Kailash Thakur, Environment Protection Law and Policy in India, Deep and Deep Publications, New Delhi.

8. Gujral. S.S, Sheela. M.A, Khattri S., Singhla R.K. A Focus and Review on the Advancement of Green Chemsitry, Indo Global Journal of Pharmaceutical Science, 2012; 2(4): 397-408.

9. Redasani V.K, Kumawat V.S, Kabra R.P, Surana S.J, Application Of Green Chemistry in Organic Synthesis, International Journal of Chem Tech Research, 2010.

10. Ahuwalia V.K, Kidvai M., New Trends In Green Chemistry,Anamayapublisher New Delhi, 2nd edition, 2007; 5-18.

11. Ahluwalia V.K, Green chemistry Enviromentally Benign Reactions, published by India books, 2nd EDITION, 2006; 1-10.

12. Anastas P.T, Heine L.G, Williamson T.V, Green Chemical Synthesis and Processes, American Chemical Soceity, Washington DC, 2000.

13. Singhal M, Singh A, Khan S.P, Sultan E, Sachan N.K, Green chemistry potential for past present and future perspectives.

14. "The 12 principles of green chemistry" United states environmrental protection agency. Retrieved 2006-07-31.

15. Redasani V.K, Kumawat V.S, Kabra R.P, Surana S.J, Application Of Green Chemistry in Organic Synthesis, International Journal of Chem Tech Research, 2010.

16. U., Green Chemistry: Challenges And Opportunities In Sustainable Development, International Journal of Current Research, 2014; 6.

Acknowledgments

I thank to University Grants Commission, India for funds provided through Minor Research Project No. F. PSW150/11-12 (ERO). I am also thankful to Sushil Kar College for research in beautiful environment.