International Journal of Engineering Science Invention (IJESI)
ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726
www.ijesi.org ||Volume 8 Issue 01 Ver. I || Jan 2019 || PP 94-95

Green Chemistry: A New Trend in The Chemical Science To Protect Our Environment

Dr. Shikha Saxena
Associate Professor
Department of Chemistry
D.A.V. (P.G.) College, Dehradun

ABSTRACT
Green Chemistry is a relatively new materializing field that endeavor to work at the molecular level to achieve sustainability. This field has received global interest in the past decade due to its ability to tackle chemical innovation to meet environmental and economic goals simultaneously. Green Chemistry avoids contamination by utilizing environmentally benign processes and innovative products. Which are 'benign by design'. Based on the concept and principles of green chemistry. This chapter provides an overview of the greener chemical processes, future potentials and prevailing trends in the conversion of residual part into valuable biomaterials.

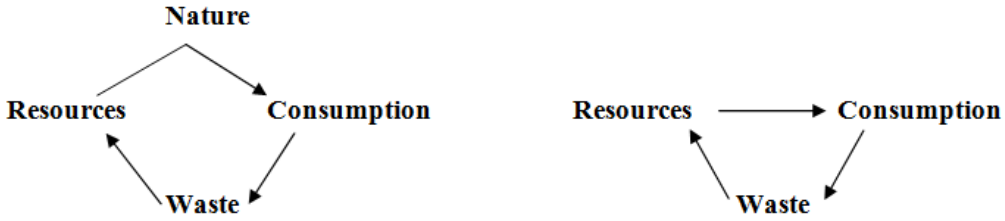
I. INTRODUCTION

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 of and generation of hazardous substance. Our bodies are contaminated with large number of synthetic chemicals, many of which are known to be toxic and carcinogenic while other remain untested for their health effects. They come to use from food, air, water and dust. We know that many such chemicals enter the environment, not only from smoke-stacks, drain-pipes, leaky storage tanks and waste sites but also as they migrate from electronics, personal care products, packaging and many more manufactured goods. The chemical components in our environment are increasing day by day of which some can be degraded but most of them are un-degradable. The addition of un-degradable products that causes instability, disorder, harm and discomfort to the ecosystem. Thus is order to reduce the risk of chemicals, a system should be introduced that must reduce the risk by not changing the effect but by changing the cause. Green Chemistry is a new approach to an old science. There is a great need to create new production system in order to prepare the younger generation to get a greener future. Thus, green chemistry is cutting edge of the chemical industry today and can fundamentally change our lives for the better in the future assessing environmental concern today.

Principle of Green Chemistry :

Paul Anastas and John Warner moved to produce a set of guidelines that have been adopted as 'mantra' for the design of environmentally benign process as 'The Twelve Principles of Green Chemistry'. These principle comprise instructions for professional chemists to implement new chemical compounds, new synthesis and new technological processes.

(1) **Prevention** – Design chemical synthesis to prevent waste. Leave no waste to treat or clean up. Most of the chemical processes and synthetic routes produce waste and toxic substances. Hence synthesis should be designed and carried out in such a way so that the waste or by product is minimum. However, it is best if the by-products and waste are not generated at all. The discharge of by products or waste into atmosphere, land or sea causes pollution also.



Nature Versus Industrial Society

(2) **Atom economy** – Synthetic methods should try to maximize the incorporation of all materials used in the process into the final product. This means that less waste will be generated as a result. The concept of 'Atom economy' was developed by Barry Trost for which he received the 'Presidential Green Chemistry Challenge Award' in 1988. It is a method of expressing how efficiently a particular reaction makes use of the reactant atoms.

(3) **Less hazardous chemical syntheses** – This principle is focused on how we make molecules and materials. The goal of this principle is to reduce the hazard of the chemicals that are used to make the products. Less Toxic materials means lower hazards to workers in industry and research laboratories and less pollution to the environment.

(4) **Designing the safer chemicals** – This principle is aimed at designing products that are safe, non-toxic and efficacious. Designing must become the fundamental aim of green chemist to effect the desired function and properties of the chemical product while minimising their toxicity to human and the environment.

(5) **Safer solvents and auxiliaries** – The use of auxiliary substance (e.g. solvents, separation agents etc.) should be made unnecessary wherever possible and innocuous when used. These solvents are mostly volatile organic compounds. Solvents are not only an important liquid for synthesis but also for extraction, separation, purification and drying. This principle of green chemistry is to promote the idea of 'greener' solvents. Some greener solvents are water, supercritical, carbon dioxide, ionic liquids, polyethylene glycol and its solutions and fluorous solvents.

(6) **Design for energy efficiency** – Aimed of this principle is energy requirements should be minimized and processes should be conducted at ambient temperature and pressure whenever possible. Traditional methods for generating energy have been found to contribute to global environmental problems such as global warming and the energy used can also be of significant cost.

(7) **Use of renewable feedstock** – Whenever it is practical to do so, renewable feedstocks ore raw materials are preferable to non-renewable ones. This principle seeks to shift our dependence on petroleum and to make products from renewable material that can be gathered or harvested locally.

(8) **Reduce Derivatives** – This principle aims to simplify that process and to look at natural system in order to design products in a simplified manner. Unnecessary derivation such as protection, blocking of groups, deprotection of groups, temporary modification of physical chemical process should be avoided as these processes increase synthetic steps which lead to decrease in yield and atom economy.

(9) **Catalyst** – The chemist prefer the use of 'green' catalyst, a catalyst that will have little to no toxicity and is recyclable i.e. it can be used over and over again in the process. Green Chemistry are investigating using enzymes to perform chemistry in the laboratory in order to obtain the desired product.

(10) **Design for Degradation** – Chemical products should be designed in a such a way, so that at the end of their function they do not persist in the environment and breakdown into innocuous degradation products. Design for degradation means when green chemistry design a new chemical such as a pharmaceutical drug or medicine or new material such as plastic, they should design it in such a way that at the end of its useful lifetime it breaks down.

(11) **Real-time analysis for pollution prevention** – Analytical methodologies need to be further developed to permit real-time, in process monitoring and control before hazardous substances form. Thus, real time analysis for a chemist is the process of 'checking the process of a chemical reaction as it happen".

(12) **Inherently safer chemicals for Accident Prevention** – This principle aims whenever possible, the substances in a process, and the forms of those substance, should be chosen to minimize risks such as explosions, fires and accidental releases. There are many examples where safe chemicals were not used and the result was disaster.

II. Conclusion

Green Chemistry is sustainable chemistry. Our future challenges in resource, environmental, economical and societal sustainability demand more efficient and benign scientific technologies for working with chemical processes and products. The practicing of Green chemistry is a necessity rather than an option, as this is now high time to protect our caring environment from further damage.

References

[1]. Green Chemistry United States Environmental Protection Agency 2006-06-28. Retrieved 2011, 03-23.
[2]. Anastas, P.T., Warner, J.C., Green Chemistry, Theory and Practice, Oxford University Press, New York, 1998, pp. 30.
[3]. Handbook of Green Chemistry, Volume 1, Green Catalysis by Paul T. Anastas
[4]. Handbook of Green Chemistry By J. N. Gurtu, Kusum Sharma