

Scope of Green Chemistry

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ABSTRACT

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Green Chemistry is new and rapid emerging branch of Chemistry. The beginning of Green Chemistry is considered as a response to the need to reduce the damage of the environment by man-made materials and the processes used to produce them. Green Chemistry could include anything from reducing wastes to even disposing of waste in the correct manner. All chemical waste should be disposed off of in the best possible manner without causing any damage to the environment and living beings. The Green Chemistry revolution is providing an enormous number of challenges to those who practice Chemistry in industry. This article focuses sustainable development, solvent less reaction, oxidation reagent and catalyst.

Keywords :- Trends of Green Chemistry; multifunctional reagent, sustainable development.

I. INTRODUCTION

Chemistry, like any other branch of Science in making progress, discovering new reagents, new synthesis and new compounds. In a similar way, green chemistry has the same future as chemistry. The additional advantage of green chemistry is that all its discoveries/ synthesis are environmentally benign. There are, however, certain areas of investigations that are scientifically challenging to chemists. However, these areas have potential for large benefits as green chemistry alternatives. Some of the new areas are discussed below.

Oxidation reagent and Catalysts

Though there is notable advancement in oxidation chemistry, but it is still one of the most polluting chemical technology. Oxidative transformations, as

we know are the basis of necessary functionalization of fundamental molecules. It is the oxidation procedures that allows petroleum based feedstocks to become chemical products, which are the starting materials of numerous chemical industries.

Over the years, in the past, many of the oxidation reagents and catalysts comprise of toxic substances like heavy metal (e.g., chromium). These substances have been used in large amounts for the manufacture of billions of kilograms of petrochemicals. All these processes have lead to the release of huge quantities of these metals into the environment. Further these toxic substances affect the human health.

The objective of green oxidations chemistry will, of course be to use and generation of non-hazardous substances, with maximum efficiency of atom incorporation.

Combinatorial Green Chemistry

Combinatorial chemistry is a practice of being able to make a large number of chemical compounds rapidly on a small scale through reaction matrices. This practice is used on a large scale in the pharmaceutical sector. In case, a pharmaceutical company identifies a compound (lead compound), which has considerable promise (as far as its biological activity is concerned) then the company would proceed in making a large number of derivatives of the lead compound and test their efficacy. In this way, the potential of a compound will be optimized. The combinatorial chemistry has enabled large number of substances to be made and screened for their activities without having any adverse effect on the environment.

In the context of green chemistry, combinatorial approach is very useful to assess the biodegradability of the products. For example, if a company has struck on a biodegradable pesticide, then combinatorial approach will be helpful to make large number of other compounds, which will have the required pesticidal activity along with biodegradability.

Proliferaton of solventless reactions.

A large number of reactions occur in solid phase without the use of solvents are not harmful to the environment. In fact, a number of solventless reactions occur more efficiently with more selectivity compared to reactions carried out using solvents. Such reactions are simple to handle, reduce pollution and are comparatively cheaper to operate. The reaction can be conducted either by heating the reactant. Alternatively, a solution of the reactants in suitable solvent (like water, alcohol, methylene chloride etc.) is stirred thoroughly with a suitable adsorbent or solid support like silica, gel, alumina, phyllosilicate. After stirring the solvent is removed in vacuo and the dried support on which the reactants have been adsorbed are used to carry out the reaction under microwave irradiation

Green Chemistry in Sustainable Development

Sustainable development means development, which meets the needs of the present without compromising the ability of the future generations to meet their own needs. The Earth Summit was held on June 3-14, 1992 at Rio de Janeiro. This was attended by delegates including 150 Heads of States. The International Community adopted Agenda 21. This was a landmark achievement, which incorporated economic and social concerns. It contained a wide variety of recommendations on the following issues:

- (i) Reducing wasteful use of natural resources.
- (ii) Fighting poverty.
- (iii) Protecting the atmosphere, oceans, plant and animal life.
- (iv) Promoting sustainable agricultural practices for feeding the ever increasing population of the world.

Sustainable development, is, in fact, related to sustainability of our natural resources. The most obvious concern for the extensive utilization of limited or depleting resources is the fact, that by definition, they can run out or become exhausted. Such resources are not regarded as sustainable either from environment or from economic point of view. An appropriate definition of sustainability is the ability to maintain the development of the quality of life while not compromising the ability of our future generations to do the same. Thus, if the present generation consumes petroleum resources to the extent that they become no longer viable and usable for future generations, this would violate the goals of sustainability. However, in case of feedstocks, it is possible to have a sustainable supply, not only for the present generation but also for future generations.

Green chemistry can play a vital role in sustainable development. Green chemistry, as we know is environmentally benign synthesis. Chemical manufacturing is the source of many useful and enjoyable products, which has not only improved the quality of life of the people but also increased their life expectancy. Some of these products include antibiotics and other medicines, plastics, gasoline and

other fuels, agricultural chemicals like fertilizers and pesticides, and a variety of synthetic fabrics including nylon, rayon and polyester. All these products are made by chemical industrial processes, which are mainly responsible for pollution of the environment. It was only in 1990, the U.S. Environmental Law was promulgated, according to which the first choice for preventing pollution is to design industrial processes that do not lead to waste production. This, in fact, is the approach of green chemistry.

Green chemistry works towards sustainability by:

- (i) Making chemical products that do not harm either the environment or our health.
- (ii) Using industrial processes that reduce or eliminate hazardous chemicals.
- (iii) Designing more efficient processes that minimize the production of waste materials.
- (iv) Preventing pollution before it happens rather than cleaning up! the mess later.
- (v) Using minimum amount of energy for any chemical process. with a view to reduce the cost of production.
- (vi) Using the most appropriate starting materials, reagents and catalysts.
- (vii) New products designed should be biodegradable.

II. CONCLUSION

Green Chemistry is new philosophical approach that through application and extension of principle of Green Chemistry and contribute to sustainable development. Great effort are still undertaken to design an ideal process that start from non-polluting materials. Most importantly we need the relevant specific scientific engineering so, we can say that this approach in chemistry is helpful in protection human health and environment.

III. REFERENCES

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