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Application of Green Chemistry in Our Daily Life

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Abstract:

Green chemistry is one of the most important topics these days. Green chemistry involves 12 set of values which minimize or removes the use or creation of hazardous materials and maximizing the desired product in an eco-friendly way. Green Chemistry is an application in chemical sciences wherein renewable raw materials are used, waste products are eliminated. Further use of toxic and hazardous reagents and solvents used in manufacturing and application of chemical products are totally by passed. . In future all division of chemistry fully depends on green chemistry due to decreasing the amount of chemical waste released to the air, water, and soil. This paper mainly highlight on applying green chemistry to day to day life so that each individual could be made aware it.

Keywords: Volatile organic compounds (VOC's), Activators, Carcinogens, Biodegradable, Green chemistry, Environment and Chemicals.

Introduction: In 1991, Paul T. Anastas coined term Green Chemistry [1]. For the demands of modern people, we need varieties chemical products and industries. These lead to the formation of hazardous products and sometimes we are use the hazardous products, the chemist are required to develop novel technologies. This new branch of chemistry called Green Chemistry. Simply, Green chemistry terms defined as – it designs the chemical process and products that reduce or eliminate the use and formation of hazardous substance [2].

Twelve principles of Green Chemistry: In 1998, “Twelve Principles of Green Chemistry” is published by Paul Anastas and John Warner. [3].

1. **Waste Prevention:** To prevent the formation of waste than to treat or clean up the waste offer its formation [4]. This principle aims to develop the zero waste technology (ZWT). It also aims to use wastage product of one system as the raw material for other systems.
2. **Atom Economy:** Synthetic method should be designed to maximize the incorporation of all materials in to the desired final product [5].
3. **% Atom economy=Formula weight of desired product/sum of formula weight of all reactants used in the reaction x 100.**

4. Less hazardous chemical synthesis: Synthetic methodologies should be designed in such way that it should avoid the use and generation of less of no toxic materials.
5. Use of nontoxic chemical: Use of non-toxic Materials should be designed to preserve efficacy of function while reducing toxicity.
6. Safer, solvents and auxiliaries: The use of auxiliaries substance should be made unnecessary wherever possible and innocuous when used.
7. Design for energy efficiency: In the synthesis of a chemical product, the energy requirements should be minimized and process should be conducted at ambient condition.
8. Use of renewable sources: A raw material feedstock should be renewable rather than depleting whenever technically and economically practical.
9. Reduce derivatives: Unnecessary derivatization by using blocking and deblocking group. Temporary modification of physical or chemical processes should be avoided.
10. Use of catalytic reagents: In a chemical synthesis catalytic reagents are superior to stoichiometric reagents. This will save the energy.
11. Design for degraation: Chemical product should be designed so that at the end of their function they do not persist in the environment.
12. Monitoring the generation of Hazardous substance: Analytical methodologies need to further developed, so that continuous monitoring on the manufacturing unit is possible.
13. Use of chemically safer products: The product in a chemical reaction should be selected in such a way that they can minimize the possibility of chemical accident explosions, fire.

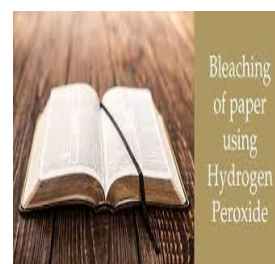
Application of green chemistry in our daily life:

1. In dry cleaning: Before use green chemistry Tetrachloroethane ($\text{Cl}_2\text{C}=\text{CCl}_2$) was used for dry cleaning of clothes [6]. But this chemical is more harmful for ground water. Now the chemical liquid CO_2 is use for dry cleaning. H_2O_2 (Hydrogen per-oxide) is also used for the purpose of bleaching clothes in the process of laundry, which gives better results and makes use of lesser amount of water.



www.lg.com

2. Bleaching of paper: In earlier for bleaching of paper chlorine gases were used. But now the latest technology has been use, hydrogen peroxide with suitable catalyst [7]. Bleaching is process of making pulp white to improve printing and its ability to absorb liquids. Chlorine react with aromatic rings of lignin to product dioxins such as 2, 3, 4-tetrachlorodioxin and chlorinated furans. These are carcinogenic and hazardous products. However, H_2O_2 with catalyst produces the similar bleaching reaction along with less harmful for the environment.



<https://images.app.goo>

3. Eco-friendly painting colors: Modern people should use eco-friendly colors to avoid effect from chemical color for our health and environment [8]. Oil based paints give off large amount of volatile organic compounds. These have many environment effects. Chempol MPS paints formulation use bio-based oils to replace petroleum based oils and create paint which is safer to use. The natural color is made from natural ingredients like spinach, beet root, and flowers. This www.earthride.com.au



Are material color which do not harm to our health and environment.

4. Putting our fires the green way: The conventionally used chemical in firefighting foam which discharge toxic product into the environment containing water and deleting ozone layer. But now new foam has been improve which is called pyro cool to put out fires without releasing any toxic agent [9].

5. Computer chips: For making of computer chips it requires excessive chemical, water and energy. At the Los Alamos National Laboratory scientists have developed a new method where carbon dioxide is used in one of the steps in chip preparation. At the University of Delaware, the former director Richard Wool established a method to making computer chip to use of chicken feathers [10].



<https://futurism.com>

6. Pesticides and insecticides: Pesticides are the chemical substances that are used to prevent repulse and control the pests. Neem oil from neem leaf extracts bark extracts and root extracts are used as bio-pesticide, fungicide and organic manure. Neem oil also used for pest control activities. Neem seed cake is used as bio-fertilizer.



<https://cdn.britannica>

7. Medicines: The pharmaceutical Chemistry is working to develop medicines with less harmful side-effect and using the processes that produce less toxic waste. Merck and Codexis develop a second-generation green synthesis of sitagliptin, the active ingredient in Januvia a treatment for type 2 diabetes. This resulted in an enzymatic process that reduces the need for a metal catalyst, waste, improves yield and safety. For the treatment of high cholesterol used the drug simvastatin, sold under the brand name Zocor is prescribed. The method to make this medication used large amount of hazardous reagents and product toxic waste. An engineered enzyme and a low-cost feedstock are synthesized by Professor Yi Tang, of the California University [11].



<http://www.dw.com>

8. Pressure cooking use: A good quality pressure cooker using is energy efficient and save up to 70% of the fuel, which is good for



<https://cdn.shopify.com>

environment and also our wallet too [12]. Pressure cookers help to minimize the greenhouse gas emissions from our gas oven and reduce electric consumption when using electric gas oven. Also save out cooking time.

9. Laboratory safety chemicals: The chemistry laboratory gives major opportunity to students for good experience with reactions and handling the apparatus. Many chemistry department have involved green chemistry in their organic chemistry laboratory, where the students learning and practicing the green chemistry.

10. Solar cell: In green technology the solar cell is very important example in converts the light energy to the electrical energy. Since 2000, the use of solar photovoltaic has been rising at an average of 43% per year. Electricity using from solar energy is less consumption of fuels, reduce pollution and greenhouse gas emission [13].



<https://www.chemservice.com>

Conclusion: Green chemistry has to be introduced in the syllabus of the students at all levels, so that they are choosing a good life to using good products in his or her everyday life. In this article, I have highlighted here for introducing how to use green chemistry in our daily life to saving our time from removing harmful chemical substances. Green chemistry is a multidisciplinary approach to raw materials, solvents, catalysis, synthesis, energy efficiency and process efficiency. The ultimate aim of green chemistry is reduce hazardous substances from the environment.

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