

What is Green Chemistry?

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ABSTRACT

Civilization and its place in economics, politics and life have become more and Chemistry has played a fundamental role in the development of human more colorful. However, chemistry is progressing.

Self, which has always been associated with profitability, has also caused significant damage to human health and the environment.

The use of green chemistry is generally associated with cost reduction, of which reducing or eliminating the total cost of disposing of chemical sponges is part of it, as well as minimizing the negative environmental consequences and effects. These two factors make companies more competitive. . Green chemistry makes the earth cleaner, safer and more productive. Green chemistry is the conscience of chemistry and the way forward.

Keywords: Green Chemistry; Permanent Economy; Catalysts; Chemical Derivatives; Pollution; Atomic Productivity.

1. Introduction

Chemistry has played a fundamental role in the development of human civilization and its place in economics, politics and life has become more and more colorful. Nevertheless, chemistry is in progress.

It has always been profitable, it has also caused significant damage to human health and the environment. , And have turned them into cases that have challenged human health and the environment. Also, these materials simply go into the natural cycle of open materials.

They do not return and remain in nature for many years as very harmful and permanent waste.

We have heard and laughed many times about the harms of chemicals to the human body and the environment. But what is the solution? Can avoiding the use of chemicals help us; to what extent can we avoid them? Which ones can we not use? Which chemical products can be found that are not harmful to human health or the environment? Drugs on which our health depends a lot on ourselves are harmful to our body. Can we not use them? Can we not drink water purified with chemicals? We are surrounded by a multitude of different chemicals, most of which we have no doubt about being poisonous and harmful, and many of which we cannot avoid.

Undoubtedly, as much as we can avoid the use of chemicals in our lives or prevent the release of such substances in nature, we have contributed to our health and the environment. But it seems that in these preventive measures, which have not yet shown significant effectiveness, we must also think of more effective ways to change the way chemicals are made to reduce their harm to humans and the environment. It is one of these ways. Today, this new approach is called green chemistry, which is the design of chemical products and processes that reduce or eliminate the use and production of substances harmful to human health and the environment.

In the science of chemistry, a green revolution is taking shape that not only brings environmental sustainability and profitability, but also reduces the risks of industrial disasters.

"Green chemistry is the production of new products using new methods that fit the three goals of a sustainable environment - a sustainable economy - and a sustainable society," said Robin Rogers, researcher and director of the Green Industrial Production Center at the University of Alabama.

1.1. Who is the green chemist?

Chemists working in this field are called green chemists. Industrial production of most products is based on chemical interactions. In the last decade, some chemists have taken a new approach to producing products without the use of toxic substances and without the production of toxic shampoos. Green chemistry Green washing is not an old technology, but a major component of new technologies that work better, are cheaper, and require less energy. In a complete period of production, from raw material to the creation of the final product, they create less pollution and added that in fact the green technology revolution is equal to the industrial revolution.

1.2. Advantages of green chemistry:

Developed and developing countries use this technology because chemistry and green technology are cheaper and better and will be able to become more competitive in the global economy and also increase their market share. Seddon Kenneth, a professor of chemistry at the University of Queens in Belfast, Ireland, says that green is an international issue because of the global spread of pollution and toxins, such as the 2005 gas leak in China due to the overturning of petrol ships. It contaminated the drinking water of millions of people, and the polluted water flowed into the easternmost part of Russia and the Songhua River.

According to British scientists, non-pollution is one of the reasons why developing countries are looking to use green chemistry, and another reason is the inability of such countries to pay the exorbitant price of petrochemicals.

The use of green chemistry is generally associated with cost reduction, of which reducing or eliminating the total cost of disposing of chemical compounds is part of it, as well as minimizing the negative environmental consequences and effects. These two factors create more competitiveness for companies. . Green chemistry makes the planet cleaner, safer and more productive. Green chemistry is the conscience of chemistry and the way of the future. A global network of environmentalists and green chemists has emerged who have defined principles for green chemistry based on 12 principles.

Principle 1: Prevent the production of waste products

It is better to prevent the production and production of toxic waste and emeralds, so that after the production of thought, toxic emeralds are harmed or the environment is cleaned of them.

Principle 2: Permanent economy, increasing productivity of atoms

Permanent economics means increasing the efficiency of chemical reactions. That is, to design chemical reactions in such a way that more final products are obtained, it is better to increase the efficiency of reactions by reducing the production of useless products and excess production.

Principle 3: Design less harmful chemical processes

Where possible, chemists should design a way to use or produce materials that have less beneficial effects on humans or the environment. There are often different raw materials for a chemical reaction, among which

You can choose the most suitable.

Principle 4: Design healthier chemicals and products

Chemical products must be designed to do their job well despite reducing the risk of toxicity. New products can be designed to be healthier and at the same time do the job well for them.

Principle 5: Use of solvents and healthier reaction conditions

The use of auxiliaries (such as solvents and separating agents) should be kept to a minimum as far as possible and when used are of the least harmful species.

Principle 6: Increase energy efficiency

In chemical processes, manufacturing and separation methods as far as possible They are designed to reduce the need for energy and to get more energy at the end of the reaction.

Principle 7: Use of recyclable raw materials

Chemical reactions must be designed to use recyclable raw materials.

Principle 8: Avoid chemical derivatives

Derivatives (such as the use of limiting groups or transient chemical and physical changes) must be reduced, as such steps require additional reagents that can produce waste products.

Principle 9: Use of catalysts. Catalysts increase the selectivity of a reaction; Reduce the required temperature, minimize adverse reactions, and increase the rate at which the reactants become final products.

Principle 10: Design for the degradability of products

Chemical products should be designed in such a way that the end products are such that they are degradable in nature and do not remain in the environment too much and decompose as quickly as possible.

Principle 11: Estimating the Real Time of a Pollution Prevention Reaction

It is very important to always follow the progress of a reaction to know when the reaction is complete because after a chemical reaction is complete

Unwanted by-products are produced.

Principle 12: Possible reduction in adverse data

One way to reduce the chance of unwanted chemical events is to use reagents and solvents that reduce the chance of explosion, fire, and unwanted release of chemicals. Damages associated with these events can be reduced by changing the state (solid, liquid, gas) or the composition of the reactants.

1.3. Efforts and achievements of green chemistry

Green chemists seek to replace current processes with healthier chemical processes, or by substituting or performing healthier raw materials.

Reactions to healthier products provide healthier products to society. Some of them try to bring chemistry closer to biochemistry, because biochemical reactions have taken place over millions of years and have not posed alarming challenges for either humans or the environment. Many of these reactions occur naturally and do not require high temperatures and pressures. Their products also easily return to the material cycle, and their by-products are beneficial to living things. Modeling these reactions can reduce current health and environmental challenges.

Another group of green chemists is trying to increase atomic productivity. During a chemical reaction, a number of atoms initiate the reaction, and at the end of most reactions we are faced with products whose number of atoms is much less than the number of all the initial atoms. Undoubtedly, those atoms have been destroyed, but left in the building of useless and often harmful products to nature, challenging the health of humans and other living things. The more atoms we can include in the products, the better we can help our health and the environment, and prevent the atoms we paid for as raw materials from being wasted.

Redesigning chemical reactions is another useful way to prevent the adverse consequences of chemicals. In this case, the designers use healthier starting materials or design processes that reach the product with fewer step reactions. They also design processes that require

fewer auxiliaries, especially chemical solvents. Sometimes biochemical and chemical reactions are intertwined, leading to healthier processes and reducing their side effects on the body's biological processes as much as possible.

Examples of the achievements of green chemists are as follows:

- 1- Alternative fuels for fossil fuels
- 2- Preparation of green and degradable plastics
- 3- Redesigning chemical reactions
- 4- Biostructures

Due to the importance of protecting the environment from waste polymer materials and the need to conduct research related to reducing the harmful risks of pollution caused by these materials in the Iranian Polymer and Petrochemical Research Institute, a committee called the Saber Committee has established its general goals. Has compiled the following form:

- 1- Follow-up and implementation of polymer material recycling projects
- 2- Follow-up and components of biodegradable polymer projects
- 3- Strengthening the attitude of being responsive to environmental issues
- 4- Familiarizing students with the issues of sustainable development and environmental protection
- 5- Investigation and possibility of replacing organic solvents with water in polymer products
- 6- Helping to develop environmental standards

According to the above goals, green projects were started and with the continuous and continuous efforts of our country's green chemists, we reached the following results.

- Increasing the strength of plastic bags made from waste

Recovery of a mixture of polyethylene, polypropylene and polyvinyl chloride waste with paper

- Retrieval and production of radiology films

Investigation and replacement of asbestos (glass wool) with polymer fibers in cement composites

- Recycling of PET waste (soft drink bottles)

Investigation of migration of additives, common packaging plastics in medicinal foods

- Optimization and extraction and preparation of quinine and chitosan from shrimp skin

- Preparation and fabrication of Imilent based on sea coral used in orthopedic surgeries

Formulation and preparation of biodegradable starch-based polyethylene.

Chemical redesign and processes have created countless new opportunities for chemists, and any chemist can design any of the known reactions.

Used for many years in the factories or laboratories of the university, in order to make it healthier and reduce costs and increase efficiency and effectiveness. Therefore, it seems that the opportunities that have been provided for chemists throughout the long and ancient history of this knowledge are now once again provided for today's chemists to edit what they have left in the history of chemistry, to make healthier memories of the future. Leave a place.

Resources

Green Peace Quarterly, Year 6, Issue 13-Fall 2004, Issue 44 Spring 2002 and Issue Forty-Five F 2000