



Sustainability in Chemistry

Chemistry and the Environment CHEM3710

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This module considers the impact of chemical science on the environment. It introduces important concepts such as pollution, climate change, and effects of chemical disasters on the environment. It also discusses doing chemistry in a sustainable way by introducing the 12 principles of Green Chemistry.

Five of these principles focus on undertaking chemical science in a sustainable way while the others focus on pollution prevention.



The five areas of green chemistry focusing on sustainability are:

Preventing Waste: This principle focuses on the prevention of waste which in chemical science are often hazardous to the environment.

Atom Economy: Synthetic methods should be designed to maximize incorporation of all materials used in the process into the final product.

Use of renewable feedstock: A raw material or feedstock should be renewable rather than depleting whenever technically and economically practicable.

Catalysis: A primary goal of green chemistry is the minimization or preferably the elimination of waste in the manufacture of chemicals and allied products: “prevention is better than cure”. This necessitates a paradigm shift in the concept of efficiency in organic synthesis, from one that is focused on chemical yield to one that assigns value to minimization of waste. Catalysts increase selectivity, increase the rate of chemical reactions, and reduce waste.

Reduce Derivatives: 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.