Droplets Of Green ChemistryFor The Balanced Life

Dr.(Mrs.) SEEMA GARG

Associate Professor in Chemistry
S.P.C. Government College, Ajmer

Abstract: Human activities since the beginning of the Industrial Revolution (around 1750) have increased the atmospheric concentration of carbon dioxide by almost 50%, from 280 ppm in 1750 to 419 ppm in 2021. The last time the atmospheric concentration of carbon dioxide was this high was over 3 million years ago.This increase has occurred despite the absorption of more than half of the emissions by various natural carbon sinks in the carbon cycle. Science and technology continuously improve all types of facilities to fulfill our needs with balancing nature.

Even civilizations have advanced techniques but still nature have been to

face various environmental degradation means Disaster- Currently, greenhouse gas emission rates, temperatures could increase by 2 °C (3.6 °F), which the United Nations' Intergovernmental Panel on Climate Change (IPCC)says is the upper limit to avoid "dangerous" levels, by 2050.

Key words :Revolution, ppm, carbon sinks, carbon cycle, greenhouse gasemission, IPCC and dangerous.

Introduction :

Chemistry on earth changes its color from green to red so there is a serious need to throw some droplets of green chemistry to survive our life.

There are many reasons like lack of education, poverty, greed,

over-exploitation of natural resources etc. changes chemistry of nature.

Literature reveals that lots of practices are coming forward to maintain the chemistry green of earth without compromising our daily needs anddisturbing our ecosystem.

Science and technology continuously improve all types of facilities tofulfill our needs with balancing nature.

Even civilizations have advanced techniques but still nature have to face various environmental degradation means Disaster-

Chemistry of nature also changes its equation due to Disasters. Disaster may occur due to natural, chemical or biological changes.

Human activities since the beginning of the Industrial Revolution (around 1750) have increased the atmospheric concentration of carbon dioxide by almost 50%, from 280 ppm in 1750 to 419 ppm in 2021. The last time the atmospheric concentration of carbon dioxide was this high was over 3 million years ago.This increase has occurred despite the absorption of more than half of the emissions by various natural carbon sinks in the carbon cycle.

These are the 10 deadliest natural disasters of 2021:

1. August 2021: Earthquake Kills 2,248 in Haiti
2. December 2021: Super Typhoon Rai Kills 375 in the Philippines
3. July 2021: Floods, Landslides in China Kill at Least 302
4. July 2021: Floods Kill More than 200 in Germany, Belgium
5. April 2021: Cyclone Seroja Kills at Least 222
6. October 2021: Flash Floods, Landslides Kill 201 in India, Nepal
7. May 2021: Cyclone Tauke Kills at Least 200 in India
8. August 2021: Hurricane Ida Kills 91 Across
9. December 2021: Tornado Kills 90 Across 5 U.S. States
10. December 2021: Volcano Eruption Kills 45 in Indonesia

Memorial by Dutch artist Ruth Kupferschmidt for those killed and disabled by the 1984 toxic gas release

Date	2 December 1984 – 3 December 1984
Location	Bhopal, Madhya Pradesh, India
Coordinates	23°16′51″N 77°24′38″E
Also known as	Bhopal gas tragedy
Cause	Methyl isocyanate leak from Union Carbide India Limited plant
Deaths	At least 3,787; over 16,000 claimed
Non-fatal injuries	At least 558,125

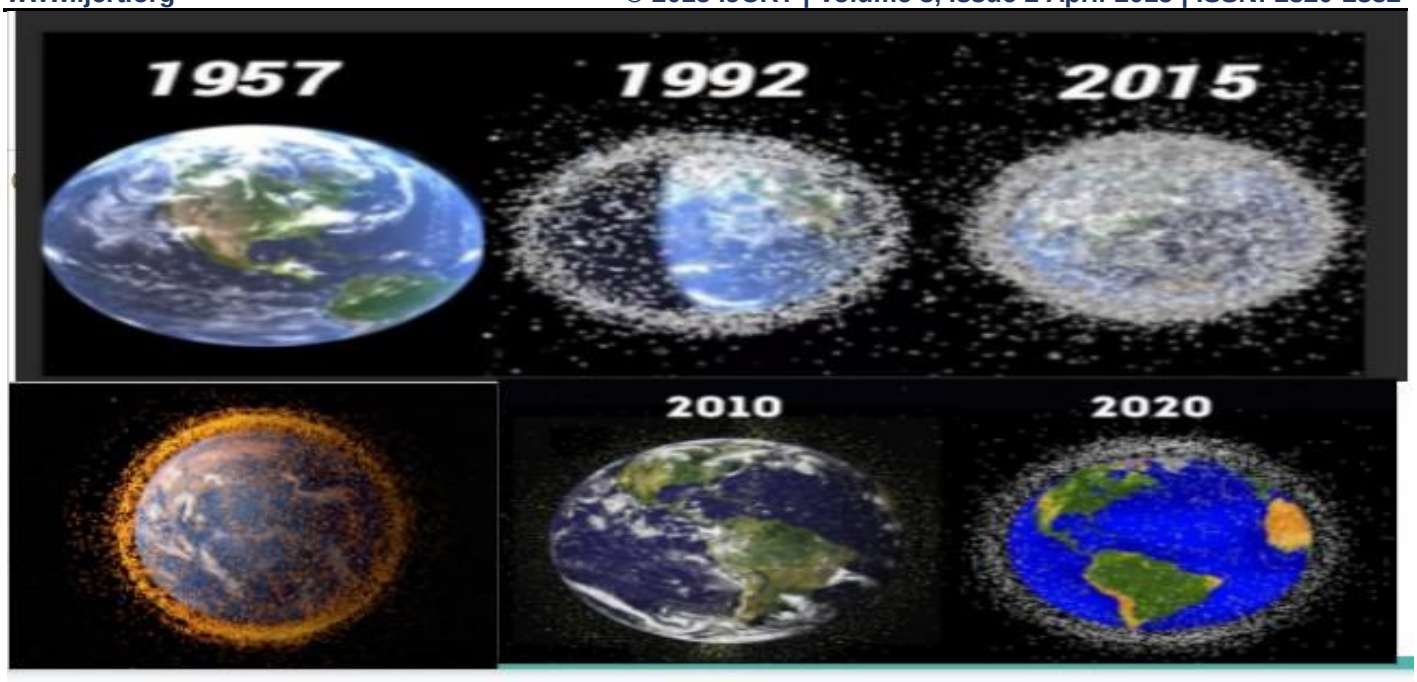
The National Oceanic and Atmospheric Administration (NOAA) started tracking Earth's heat around 139 years ago. Recently, the numbers revealed something disturbing. Although the last few decades saw a steady rise in the planet's temperature, the last five years (2014–18) were the hottest on record.

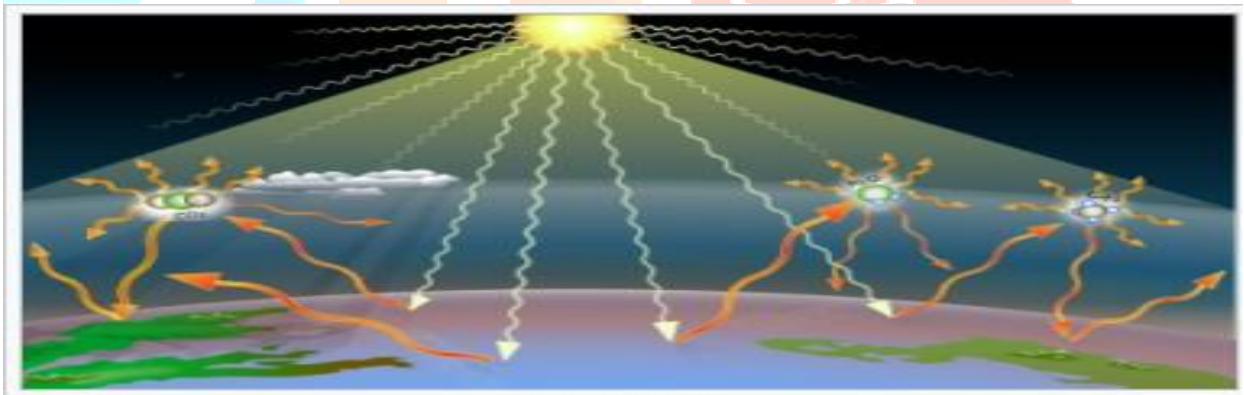
The Heat Streak

Alaska's annual spring melt is a dodgy time for the locals. Many rely on frozen waterways as a means for transportation. Scientists keep a close watch on the temperatures to make sure that nobody uses the lanes when the seasons change and spring weakens the ice.

Alaska's Deadly Melt

At current greenhouse gas emission rates, temperatures could increase by 2 °C (3.6 °F), which the United Nations' Intergovernmental Panel on Climate Change (IPCC) says is the upper limit to avoid "dangerous" levels, by 2050. The vast majority of anthropogenic carbon dioxide emissions come from combustion of fossil fuels, principally coal, petroleum (including oil) and natural gas, with additional contributions from deforestation and other changes in land use.





The greenhouse effect of solar radiation on the Earth's surface caused by emission of greenhouse gases.

Fundamentals of Green Chemistry

Green chemistry is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances. Green chemistry applies across the life cycle of a chemical product, including its design, manufacture, use, and ultimate disposal. Green chemistry is also known as sustainable chemistry.

- Prevents pollution at the molecular level
- Is a philosophy that applies to all areas of chemistry, not a singlediscipline of chemistry
- Applies innovative scientific solutions to real-world environmentalproblems
- Results in source reduction because it prevents the generation ofpollution
- Reduces the negative impacts of chemical products and processes onhuman health and the environment
- Lessens and sometimes eliminates hazard from existing products andprocesses
- Designs chemical products and processes to reduce their intrinsic hazards

How green chemistry is different than cleaning up pollution activity Green chemistry reduces pollution at its source by minimizing or eliminating the hazards of chemical feedstocks, reagents, solvents, and products.

This is unlike cleaning up pollution (also called remediation), which involves treating waste streams (end-of-the-pipe treatment) or cleanup of environmental spills and other releases. Remediation may include separating hazardous chemicals from other materials, then treating them so they are no longer hazardous or concentrating them for safe disposal. Most remediation activities do not involve green chemistry. Remediation removes hazardous materials from the environment; on the other hand, green chemistry keeps the hazardous materials out of the environment in the first place.

If a technology reduces or eliminates the hazardous chemicals used to clean up environmental contaminants, this technology would qualify as a green chemistry technology. One example is replacing a hazardous sorbent [chemical] used to capture mercury from the air for safe disposal with an effective, but nonhazardous sorbent. Using the nonhazardous sorbent means that the hazardous sorbent is never manufactured and so the remediation technology meets the definition of green chemistry.

12. Principles of Green Chemistry

These principles demonstrate the breadth of the concept of green chemistry:

1. Prevent waste: Design chemical syntheses to prevent waste. Leave no waste to treat orclean up.

2. Maximize atom economy: Design syntheses so that the final product contains the maximum proportion of the starting materials. Waste few or no atoms.

3. Design less hazardous chemical syntheses: Design syntheses to use and generate substances with little or no toxicity to either humans or the environment.

4. Design safer chemicals and products: Design chemical products that are fully effective yet have little or no toxicity.

5. Use safer solvents and reaction conditions: Avoid using solvents, separation agents, or other auxiliary chemicals. If you must use these chemicals, use safer ones.

6. Increase energy e ciency: Run chemical reactions at room temperature and pressurewhenever possible.

7. Use renewable feedstocks: Use starting materials (also known as feedstocks) that are renewable rather than depletable. The source of renewable feedstocks is often agricultural products or the wastes of other processes; the source of depletable feedstocks is often fossilfuels (petroleum, natural gas, or coal) or mining operations.

8. Avoid chemical derivatives: Avoid using blocking or protecting groups or any temporary modifications if possible. Derivatives use additional reagents and generate waste.

9. Use catalysts, not stoichiometric reagents: Minimize Waste by using catalytic

reactions. Catalysts are effective in small amounts and can carry out a single reaction many times. They are preferable to stoichiometric reagents, which are used in excess and carry out a reaction only once.

10. Design chemicals and products to degrade after use: Design chemical products to break down to innocuous substances after use so that they do not accumulate in the environment.

11. Analyze in real time to prevent pollution: Include in-process, real-time monitoring and control during syntheses to minimize or eliminate the formation of byproducts.

12. Minimize the potential for accidents: Design chemicals and their physical forms (solid, liquid, or gas) to minimize the potential for chemical accidents including explosions, fires, and releases to the environment.

Green chemistry's roots in the Pollution Prevention Act of 1990

To stop creating pollution in the first place became America's o cial policy in 1990 with the Federal Pollution Prevention Act .

The law defines source reduction as any practice that:

- Reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal.
- Reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

The term "source reduction" includes:

- Modifications to equipment or technology
- Modifications to process or procedures
- Modifications, reformulation or redesign of products
- Substitution of raw materials
- Improvements in housekeeping, maintenance, training, orinventory control

Section 2 of the Pollution Prevention Act establishes a pollution preventionhierarchy, saying:

- The Congress hereby declares it to be the national policy of the United States that pollution should be prevented or reduced at the sourcewhenever feasible;
- Pollution that cannot be prevented should be recycled in anenvironmentally safe manner, whenever feasible;
- Disposal or other release into the environment should be employedonly as a last resort and should be conducted in an environmentallysafe manner.

Green chemistry aims to design and produce cost-competitive chemical products and processes that attain the highest level of the
pollution-prevention hierarchy by reducing pollution at its source.

For those who are creating and using green chemistry, the hierarchy lookslike this:

1. Source Reduction and Prevention of Chemical Hazards
- Designing chemical products to be less hazardous to human healthand the environment*
- Making chemical products from feedstocks, reagents, and solventsthat are less hazardous to human health and the environment*
2. Designing syntheses and other processes with reduced or even no chemicalwaste
- Designing syntheses and other processes that use less energy or lesswater
- Using feedstocks derived from annually renewable resources or fromabundant waste
- Designing chemical products for reuse or recycling
- Reusing or recycling chemicals
3. Treating chemicals to render them less hazardous before disposal
4. Disposing of untreated chemicals safely and only if other options are not feasible

Chemicals that are less hazardous to human health and the environment are:

- Less toxic to organisms
- Less damaging to ecosystems
- Not persistent or bioaccumulative in organisms or the environment
- Inherently safer to handle and use because they are not Rammable orexplosive

Droplets of Green Chemistry is for the Balanced Life

Conclusion

To maintain chemistry green and avoid disaster follow following steps:

- 12 Principles of Green Chemistry
- Never Neglects or disregards the existence of earth, air, fire, water and vegetation means disregards his own existence which is entwined with them.
- The most important principle of the environment is that you are not the only element.
- Be compassionate towards living beings.