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Role of Chemistry in Environment: A Review

Madhu Singh Lodhi[1], Rakeshbais[2], Sarvar Jahan[3]

[1]B.Sc. forensic science (3rd Year), School of Science, Sam Global University, Raisen, India lodhimadhu777@gmail.com
[2]B.Sc. forensic science (3rd Year), School of Science, Sam Global University, Raisen, India shasatrirakesh@gmail.com
[3]Assistant Professor, Department of Chemistry, Sam Global University sarvarchemistry786@gmail.com

ABSTRACT: -

Chemistry holds significant importance as all matter in the universe is composed of chemical substances. It provides explanations for the phenomena we observe in our surroundings. The field of chemistry has greatly enhanced our quality of life by producing lifesaving medications, synthetic fibers, a wide array of cosmetics, diverse plastics, fertilizers, pesticides, and aesthetically pleasing paints, among other products. Furthermore, chemistry enables us to comprehend, assess, safeguard, and enhance the environment in which we live. Today, plastics are integral to both industrial applications and everyday household use.

Key Words: -*Chemistry, environment, petroleum-based plastic and pollution*

1. INTRODUCTION

Chemistry is a branch of science dedicated to the examination of matter and the various substances that comprise it. This field encompasses the investigation of the characteristics of these substances and the chemical reactions they undergo to produce new materials. The primary focus of chemistry is on atoms, ions, and molecules, which collectively form elements and compounds. These chemical entities interact with one another through the formation of chemical bonds. Additionally, the discipline of chemistry also explores the interactions between matter and energy. The analysis of the properties, compositions, and structures of elements and compounds, along with the transformations they undergo and the energy changes associated with these processes, constitutes the core of this scientific field.

2. Environment

The environment encompasses all elements surrounding us, including both biotic and abiotic components such as soil, water, flora, and fauna, which adapt to their respective habitats. It is a natural endowment that sustains life on Earth. The environment is crucial for the survival of life on our planet. The term "environment" originates from the French word "environ," meaning "surrounding." An ecosystem comprises all living and non-living entities within the environment and serves as the foundation of the biosphere, influencing the overall health of the Earth. Ecology and environmental science are disciplines within life sciences that focus on the study of organisms and their interactions with one another and their environment.

3. GREEN CHEMISTRY

Green chemistry, often known as sustainable chemistry, is a field of chemistry dedicated to the design and enhancement of processes and products aimed at minimizing or completely eliminating the generation and utilization of harmful substances. It is important to distinguish green chemistry from environmental chemistry. The former emphasizes the environmental implications of chemical practices and the advancement of sustainable methods that are beneficial to the environment, such as decreasing the use of non-renewable resources and implementing measures to mitigate environmental pollution. In contrast, environmental chemistry concentrates on the impact of specific toxic or hazardous chemicals on the ecosystem.

4. PRINCIPLES OF GREEN CHEMISTRY ARE

- Waste prevention instead of remediation
- Atom economy or efficiency
- Use of less hazardous and toxic chemicals
- Safer products by design

- Safe solvents, minimum use of solvents which are toxic to the environment.
- Energy efficiency by design
- referred use of renewable raw materials
- Catalytic rather than stoichiometric reagents
- Design products to undergo degradation in the environment
- Analytical methodologies for pollution prevention
- Inherently safer processes
- Incorporation of safe chemistry for the prevention of accidents

5. PLASTIC

The term "plastic" originates from the Greek word "Plastikos," which translates to "to mould." Fossil fuels consist of compounds that contain hydrogen and carbon, known as hydrocarbons, which serve as the fundamental components for long polymer molecules. These components, referred to as monomers, connect to create extensive carbon chains known as polymers. Upon its initial introduction, plastic was celebrated as a remarkable innovation. It possesses a variety of advantageous properties, including being lightweight, durable, cost-efficient, easy to manipulate, electrically and thermally insulating, water-resistant, and resistant to microorganisms.

6. PLASTIC POLLUTION

The proliferation of synthetic plastic products has led to significant challenges for wildlife and their habitats, as well as for human communities. The introduction of Bakelite in 1907 marked a pivotal moment in material science, as it brought synthetic plastic resins into global markets. By the conclusion of the 20th century, plastics were recognized as enduring pollutants across various ecosystems, from the heights of Mount Everest to the depths of the ocean. Plastics pose numerous threats, including being ingested by animals who mistake them for food, obstructing drainage systems and causing flooding in low-lying regions, and contributing to considerable visual pollution. The production of plastic bags is particularly concerning, as it releases carbon and other harmful gases, exacerbating environmental issues. Specifically, the incineration of 1 kilogram of plastic generates approximately 2.8 kilograms of CO2.

7. BIOPLASTICS

Bioplastics are plastic materials that are produced from renewable sources. These sources can be vegetable oils and fats, corn and rice starch, food waste, straw, woodchips, plants, sawdust, etc. Bioplastics are a suitable replacement for conventional plastic which is made of non-renewable sources like petroleum and natural gas. They can be made from agricultural by-products or from used plastic items using microorganisms. While most bioplastics are biodegradable, not all of them are readily biodegradable or compostable. Some may even be slightly toxic because of the other chemicals used during its manufacturing. Biodegradability is a chemical process in which microorganisms present in the environment break down materials into natural substances such as CO2, water and compost without harming the environment. This process depends on the surrounding environmental conditions (e.g. temperature, water, oxygen) and chemical properties of the material etc.

8. ADVANTAGES OF BIOPLASTICS

To achieve the aim of sustainable production and consumptionand in search of new material solutions, bioplastics have a number of benefits. They reduce carbon footprint and provide energy savings in production. They save non-renewable raw materials by using biomass which is regenerated annually. Their production decreases non-biodegradable waste that contaminates the environment. They do not contain additives like phthalates, bisphenol A or polybrominated diphenyl ethers which are harmful to human health.

9. POSITIVE EFFECTS OF HUMAN ACTIVITIES

- **Renewable energy**: Using solar, wind, and hydropower can reduce greenhouse gas emissions and help fight climate change.
- **Recycling**: Recycling waste materials to make new products can reduce pollution and landfill waste.
- **Reforestation**: Planting trees and restoring degraded ecosystems can improve biodiversity, sequester carbon, and provide habitats for wildlife.
- **Sustainable agriculture**: Organic farming, permaculture, and agroforestry can improve soil health, reduce chemical inputs, and increase biodiversity.

- **Environmental education**: Campaigns that raise awareness and encourage people to take action for the environment can help foster a sense of stewardship.
- **Breeding programs**: These programs can help preserve endangered species.
- **Protecting habitats**: Protecting natural preserves and forests can help maintain biodiversity and support the survival of ecosystems.

10. CONCLUSION

Our policies set out how we will preserve our stock of material resources by minimising waste, promoting resource efficiency and moving towards a circulareconomy.Comprehensive and regular waste collection systems should be available to collect as much waste material as possible, promote householder and commercial participation and ensure that high levels of quality recyclable or compostable materials are available for reprocessing. This will preserve our stock of natural resources by ensuring as much used material as possible gets converted into new products again. Not all plastics can be recycled indefinitely.

11. REFERENCES

1. Bagley, M. (2014). *What is chemistry?* Live Science Contributor. Available at: [livescience.com/45986-what-is-chemistry.html](https://www.livescience.com).
2. Holman, J. (1995). *Chemistry Text of Publications.* Thomas Nelson and Sons Ltd, UK.
3. Mitroff, S. (2020). *No, you should not make your own hand sanitizer.* CNET. Available at: [cnet.com](https://www.cnet.com).
4. Grandjean, P., Timmermann, C.A.G., Kruse, M., Nielsen, F., Vinholt, P.J. (2020). *Severity of COVID-19 at elevated exposure to perfluorinated alkylates.* PLOS ONE. DOI: [10.1371/journal.pone.0244815](https://doi.org/10.1371/journal.pone.0244815).
5. Bayer, I.S., Guzman-Puyol, S., Heredia-Guerrero, J.A., Ceseracciu, L., Pignatelli, F., Ruffilli, R., Cingolani, R., Athanassiou, A. (2014). *Direct transformation of edible vegetable waste into bioplastics.* *Macromolecules*, 47, 5135–5143.
6. Ebbing, D., Gammon, S.D. (2016). *General Chemistry.* Cengage Learning. ISBN 978-1-305-88729-9.
7. Emadian, S.M., Onay, T.T., Demirel, B. (2017). *Biodegradation of bioplastics in natural environments.* *Waste Management*, 59, 526–536.
8. Jain, R., Tiwari, A. (2015). *Biosynthesis of planet-friendly bioplastics using renewable carbon sources.* *Journal of Environmental Health Science & Engineering*, 13(1), 11.
9. Burgos, N., Valdés, A., Jiménez, A. (2016). *Valorization of agricultural wastes for the production of protein-based biopolymers.* *Journal of Renewable Materials*, 4, 165–177.