International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

An Overview of Sustainable Chemistry at Southern Karnataka in the Post Pandemic Resurgence: The Challenges and Concerns

Chandrashekhara Kumar B

Department of Chemistry, Yenepoya Institute of Arts, Science, Commerce and Management, Balmatta, Mangalore, Yenepoya (Deemed to be University) - 575002
Email: *chandrashekhar[at]yenepoya.edu.in*

Abstract: ***The disease caused by the Covid - 19 pandemic virus was a deadly disease that gripped the world. Just now the world is getting free from this disease and chemistry has become very helpful to save its routine from corona disease. Several pharmaceutical companies around the world have developed a vaccine to combat the mutated corona virus in a short period of time. Indian pharmaceutical companies have been reasonably successful in eradicating the corona virus. Health - promoting sustainable medicines and sustainable chemical practices have succeeded in preventing corona disease. Sustainable chemistry is also a process that stimulates innovation across all sectors to design and discover new chemicals, production processes and product stewardship practices that will provide increased performance and increased value while meeting the goals of protecting and enhancing human health and the environment. Sustainable chemistry has gained innovation and excellence in fields such as health, food, agricultural equipment manufacturing, household appliances and nanotechnology. The article emphasizes on sustainable chemistry methodologies adopted in autonomous education institutions, state government and deemed to be universities around Mangalore in Dakshina Kannada district. The study will also include solid waste/disposal management at the major hospitals in Dakshina Kannada following suitable disposal methodology and practices undertaking by the hospitals located around Mangalore for encouraging sustainable chemistry research. This article will mainly focus on the case study that will be carried out on the environmental and societal benefits of sustainable chemistry include avoiding the use of persistent, bioaccumulative, toxic, and otherwise hazardous materials as well as the challenges and concerns arise on sustainable chemistry in the post pandemic period.***

Keywords: Sustainable chemistry, Post pandemic resurgence, Universities, Dakshina Kannada

1. Introduction

Sustainable chemistry is also known as green chemistry which is showing a ecofriendly perspective towards social survival concern. Sustainable chemistry is a part of science that complements and improves the environment. American scientist Paul T. Anastas coined the term Green Chemistry in 1998. . Later the same concept was adopted by most of the countries to reduce the risks of chemicals, minimizing pollution and also minimize the health related issues. Sustainable chemistry development is a growing social concern and has been revealed through various instances occur in the nature. Safety and conservation of physical and human environments in the aim of sustainable Chemistry. The integration of chemical knowledge with the 2030 agenda for sustainable development pathway towards incorporating GSC in to the curricula of 1° 2° & 3° education including institutions related to science and engineering. courses. The green chemistry concept was generated during 1980 - 1990 throughout the globe, about minimizing the problems arose due to exposure of hazardous Chemicals into society. As result, the sustainability important 12 Chemistry came principles of green chemistry exist for the sustainability of good environment and health throughout the universe. Management of sustainable chemistry applicable to all social stakeholders like all professionals, household partners This article focuses on the concern and challenges before the people of Mangalore towards the Sustainability of Chemistry in the post pandemic rejuvenation era in the existing society.

2. The Challenges and Concerns: An overview

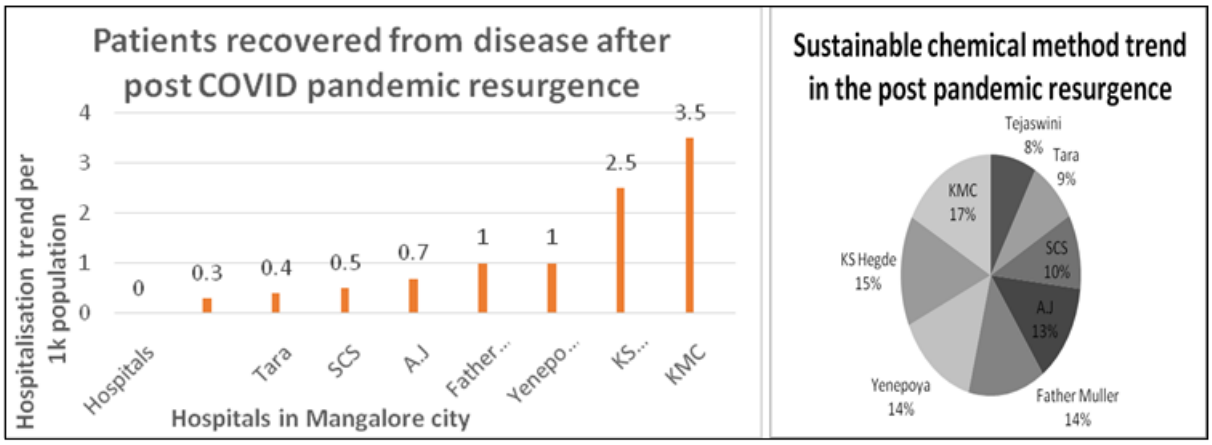
Research activity at Institutions

There are reputed institutions provide good teaching in Mangalore region. The institutions like Mangaloree University, Nitte University, Yenepoya University, Manipal University and other institutions provide good education to the students and research scholars with sophisticated state of the art facilities. As per research activities carried out at institutions located in Mangalore region, especially department of chemistry, department of pharmacy and the departments having chemical education have shown significant changes in carrying out research work with ecofriendly substances and products. The sustainable chemistry research work has been carried out with sonicator, microwave irradiating instruments and suitable reaction schemes by keeping environmental concerns. Green chemistry experiments are being carried at research centers in most of the academic institutions which is highly needed for the sustainable development of the society. Our research survey has revealed the majority of research experts focus on the synthesis of environment benign products. Hence green chemistry revolution on chemistry will have gig impact on sustainable development of environment.

Medical sector

Mangalore is manifested with many multispecialty hospitals such as Manipal hospitals, A. J Hospitals, Father Muller Hospitals, Venlock government district hospital, K. S Hegde Hospitals, S. V. S Hospitals, Colaco, Apollo Hospitals so on. Now main concern of discussion in this article is to check the adaption of sustainable chemistry practices and analysis

of toxic chemicals used on day today basis at multispecialty hospitals. The following graph represents the hospitals exhibiting sustainable developments on some chemical methods.



Domestic Usage

We can apply the concept of sustainable chemistry at our home in many ways in preventing formation of hazardous substances as well as affecting environment. We can use induction cookware and solar cooking wares for our house hold needs. So that usage of gas cooking methods can be reduced and nonrenewable gas consumption can be drastically minimized to reduce environmental issues as well as environmental pollution. Proper ideology should be followed to choose food items and list with proper quantities of house hold food items and commercially supplying food items should be made before buying the things. Food making quantity should be minimized at the marriage parties, social programs; catering supply etc can save food quantities against wasting the food unnecessarily. People should not throw food items during any events and programme. Lot of effort is being put to make food grains and huge expense invested upon that also going to waste.

People of Mangalore use electronically made house hold appliances to reduce harmful exhaustive gases like carbon dioxide, steam, …. etc. Instead of gas cooking methods, other food cooking methods like solar cooking method, biofuel using method and electrical methods are adapted to cook food at almost houses in Mangalore.

Agriculture

Fertilizers and pesticides are the main chemical substances used for the fast growth of plants and good yield. The reason arised to save environment by using most of the chemicals as fertilizers and pesticides. The vision of using most of the chemicals as fertilizers and pesticides has been changed to organic farming manures which is ecofriendly produced by verms through vermicomposting. Pesticide spraying is being carried out DRONE which is the ultimate technology to do chemical spraying. But the major challenge is energy consumption, extra effort, no proper specified space, random treatment, no effective delivery of pesticides to the assigned covering area. The concern of sustainable chemistry is not only on minimizing chemicals as well as proper method to deliver the same.

Agricultural practices have been modified to modern cultivation methods in order to reduce soil, water and air pollution. New agricultural practices Precision farming, hydroponics, aquaponics, and vertical farming in which water soluble fertilizers containing nitrogen, phosphorous and potassium as constituents help in balancing natural ecosystem. The most appropriate method of farming by the Mangalore people is organic farming located in Western Ghats which is rich in evergreen forest plants. Due to heavy rainfall and favorable soil conditions plants like areca nut, coconut, some vegetables, rubber plants, cashew nut, Jackfruit…etc abundantly cultivated at this region with ecofriendly agricultural practices.

Food items

Food preservatives, flavorings and clouring agents are the main chemical constituents used in most of readymade food products. Now a day's healthy preservatives has been used to preserve most of the junk food. In spite of using synthetic food products other natural food products got importance as healthy food items, snacks, beverages, spices, groceries, organic food having good therapeutic value and sustainable health habits maintained after the COVID 19 pandemic disease. Nitrogen gas is filled in most of the readymade food packets which is healthy for food consumers. Plastic bags are banned in most of municipal cities for many problems on environmental concerns. The various problems like non - biodegradability, animal consumption, imbalance in biological cycle and relevant consequences cause trouble to the normal sustainability of the environment.

Green chemistry food analysis has been adapted by the industries located in and round Mangalore revealed through our industrial visit from Yenepoya Institution. Sustainable approaches are followed to make food products in industries like automation, reduce energy consumption, minimize toxic reagents, Environmental friendly food wraps are a sustainable alternatives to single use cling wrap nowadays. These food wraps are made from natural materials like organic cotton and beeswax keeping the material as biodegradable and non toxic.

Waste Minimization

Waste minimization is not only waste treatment but also the process designed to change the physical, chemical, or biological composition of waste streams. For instance, compiling, neutralization, dilution, and incineration are not typically considered as waste minimization methods. Waste

minimization refers to strategies that are aiming to reduce waste content through upstream interventions. It is also given to emphasize the importance of avoiding the generation of waste rather than focusing on the management of waste materials after they are generated. On the production side, these methods are aiming at customizing and optimizing resource and energy use and lowering toxicity levels during manufacture. Methods that are adapted to minimize waste and improve resource efficiency even before the manufacturing process, for example, product design, pure production, use of scrap material, improved quality control, waste exchanges, etc. On the consumption side, waste minimization strategies aim to strengthen awareness and prompt environmentally conscious consumption patterns and consumer responsibility to reduce the overall levels of waste generation.

Waste minimization activities achieved by sustainable chemistry principles are at the root of the solution especially to chemical waste minimization. Despite of its enormous potential, the sustainable chemistry approach is still undetermined. Sustainable chemistry is mainly applied to the manufacturing process. Nonetheless the progress in the process would indirectly benefit the life cycle as a whole. It is clear that sustainable chemistry promotes less production of waste and takes a significant role in gaining industrial ecological goals as well. Industrial Ecology has significant goals and principles both for sustainable chemistry and waste minimization. The main difference comes from the larger scale of Industrial production, as it reaches beyond the walls of an industrial facility. Reductions in hazardous waste volumes can also have the effect of reducing the overall toxicity of the manufacturing process and final product. Waste prevention means the reduction of production of waste, decrease in the use of raw materials and energy and the enhancement of the re - use. It is very important to implement industry's regulation toward waste minimization. Industry seems to assume that waste minimization means only the reduction of the amount of waste sent to landfill, thus any kind of activity, especially off - site utilization and incineration, is seen as waste minimization. An environmental specialist, who would like to implement a waste minimization program, should understand the concepts of waste minimization, sustainable chemistry and Industrial Ecosystem and their use. The drivers to include a waste minimization initiative may be different; public pressure and legislation are the main reasons. The increasing cost of end of pipe treatment and potential for reducing cost are also significant motivations.

Mapping resources use and waste generation, as well as sharing the knowledge of the concepts of waste minimization with chemical industry are the next challenges to be faced. It is hoped that the research in sustainable chemistry will contribute to the establishment of a culture of waste minimization in industries like chemical, pharmacy and bulk drugs.

Mangalore and Udupi district peoples manage waste materials through various methods like separating dry waste and wet waste produced from domestic wastes while disposing the waste materials in to garbage dumping yard. In order to reduce the usage of plastics, the people of South India use cotton made materials in most of the domestic applications which is highly ecofriendly to the environment.

Textiles and Fashion

Non - polar solvents do not mix properly with nature due to natural theories like poles attract like poles; means water is polar solvent mix with polar solvents. In textile industries hydrocarbon and oxygenated solvents are used to process the fiber products which are nonpolar solvents. Solvents produced from renewable resources such as alcohol like ethanol, methanol and its derivatives produced by fermentation of sugar - containing feed stock; starchy materials or lignocelluloses materials may be selected. This substitution for petrochemical solvents leads to an avoidance of the use of fossil resources (petrochemicals) and fossil - fuel - related emissions of CO_2, methane, SO_2, and oxides of nitrogen into the environment. Ionic solvents, non - volatile solvents and ester solvents are favorable solvents used in textile industry as sustainable green chemistry solvents. The most important application of green chemistry is the use of enzymes in textile preparatory processes. The enzymes are applied in various stages of textile processing namely desizing, scouring, bleaching, dyeing, finishing and composting.

Lipsticks may be made from several waxes such as beeswax, ozokerite, and candelilla wax. Because of its high melting point, carnauba wax is a key ingredient in terms of strengthening the lipstick. Various oils and fats are used in lipsticks, such as olive oil, mineral oil, cocoa butter, lanolin, and petrolatum.

Nowadays most of the textile materials manufactured from cellulose present in malvaceae plants like jute available in westernghats located in and around Mangalore. Moreover local manufacturing small scale industries produce gramodhyoga products which are favorable to human health and environment of Mangalore tropical region.

Multidisciplinary approach

The Indian government has started a new concept of implementing sustainable development on green crackers during COVID 19. pandemic disease era. The most discussing topic across the globe is sustainable developments in the environment. The world is worried and disturbed by the pollution of the atmosphere

All the people of the world need to make a united effort to lead a healthy life, the result of which is the new effort Sustainable Development. After the impact of the Covid epidemic in India, there is a great need for sustainable development, one of which is Green Crackers. Protecting and preserving our sustainable environment is our primary duty

3. Conclusion

We the humans are social and eco - friendly creatures in the nature As our life and daily activities are carried out in the environment, the consequences of which directly affect the environment. The deadly disease spreading virus spread through the environment was the cause of human downfall. In the same way, the use of paper instead of plastic material

has increased, the production of bio - polymers in plastic technology has increased, and the transportation system has replaced to electric and CNG vehicles from fuel vehicles. . This article also mentions the changes in sustainable development policies that have arisen in the wake of Covid - 19 and includes the challenges and concerns involved.

References

[1] Istvan. T. Horvath; Introduction to sustainable chemistry, chemical reviews, volume 118, Issue 2; 369 - 886; Jan 24, 2018.
[2] Teresa celestino, High School Sustainable and Green Chemistry: Historical–Epistemological and Pedagogical Considerations, sustain chem., volume 4 (3), 304 - 320, Sept 14, 2023.
[3] Abhishek Mishra, Meenakshi Choudhary, Sustainable chemical preventive models in COVID - 19: Understanding, innovation, adaptations, and impact, Journal of the Indian chemical society, Volume 98 (10), 100164, oct 2021.
[4] Biswajit Debnath, Shiladitya Ghosh, Resource Resurgence from COVID - 19 Waste via Pyrolysis: a Circular Economy Approach, circular economy and sustainability, volume 2, 211 - 220, august 2021.
[5] Wenwu Zhao, Caichun Yin Achieving the Sustainable Development Goals in the post - pandemic era, humanities and social sciences communications, volume 9, 258, August 2022