The Role of Chemistry in Nigerian Industries for Sustainable Development of the Nation

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***Abstract*— Nigeria like any nation in the world is facing challenges in the field of chemical technology in industries. To address the challenge chemistry is actually central to many of the environmental and resources use, issues at the heart of sustainable development. An emerging approach in this challenge known as Green Chemistry seeks to end the diverse set of environmental perspective and interests in every day practice of chemists who are mostly responsible for using and creating new materials or chemicals. The approach intends to eliminate the intrinsic hazard itself, rather than focusing on reducing risks by minimizing exposure thereby leading to a more environmentally acceptable chemical processes and products. As the feedstock industry for modern society, the chemical industry plays a major role in advancing science and technology to support the design, creation, processing, use, and disposal of chemical substances that provide a foundation for sustainability.**

***Keywords*—Sustainability, Development, Chemistry, Technology, Nigeria.**

I. INTRODUCTION

Sustainable development is defined as the process in which the exploitation of natural resources, the allocation of investments, and the process of technological development and organizational change are in harmony with each other for both current and future generations. (Cliff *et al*., 2004). Based on this context, "sustainability" is a path forward that allows humanity to meet current environmental and human health, economic, and societal needs without compromising the progress and success of future generations. (Graedel & Allenby, 1995). Sustainable practices refer to products, processes, and systems that support this path. For example, such processes might involve developing new energy resources to meet societal needs; but to be sustainable, they must also be economically competitive and not cause harm to the environment or human health. (Suberu*, et al*., 2012)

II. SUSTAINABLE DEVELOPMENT AND CHEMISTRY

The world with a continuously increasing population and limited resources, the idea of sustainable development is of major importance. Only research and innovation will allow the development of economic and social networks and processes that fulfill the requirements of sustainability. The future has to be planned with visions, creativity, and fantasy, including brand new approaches and the exploration of the unknown. Chemistry, as the science of matter and its transformation, plays a central role in this process. (Cliff*, et al*., 2004)

III. GREEN TECHNOLOGY

Basically, green technology is that in which the technology is environmentally friendly and is created and used in a way that conserves natural resources and the environment. You may hear green technology being referred to as environmental technology and clean technology. Green technology is a field of new, innovative ways to make changes in daily life. (Lancaster, 2002)

IV. GOALS OF GREEN TECHNOLOGY

Green technology is the future of this society. Its main goal is to find ways to produce technology in ways that do not damage or deplete the Earth's natural resources. In addition to not depleting the natural resources, green technology is meant as an alternative source of technology that reduces fossil fuels and demonstrates less damage to the human, animal, and plant health, as well as damage to the world. Green technology is used so that products can be re- used and recycled. The use of green technology is supposed to reduce the amount of waste and pollution that is created during production and consumption. (Lancaster, 2002)

V. GREEN CHEMISTRY

The term green chemistry is defined as, "The design, development, and implementation of chemical processes and manufactured products to reduce or eliminate substances hazardous to human health and the environment". (Anastas & Warner, 1998) "Green Chemistry" is the universally accepted term to describe the movement towards more environmentally acceptable chemical processes and products. It encompasses

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education, research, and commercial application across the entire supply chain for chemicals. Green Chemistry can be achieved by applying environmentally friendly technologies – some old and some new. While Green Chemistry is widely accepted as an essential development in the way that we practice chemistry, and is vital to sustainable development, its application is fragmented and represents only a small fraction of actual chemistry.

VI. PRINCIPLES OF GREEN CHEMISTRY

There are twelve guiding principles which are summarized as follows;

1. Production of waste is minimized through reaction design.
2. The maximum amounts of reagents are converted into useful products.
3. Non- hazardous raw materials and products are used and produced wherever possible.
4. Processes are designed to be inherently safe.
5. Greater consideration is given to use of renewable feedstock.
6. Processes are designed to be energy efficient. (Anastas et-al; 1998)

VII. DEVELOPING COUNTRIES AND GREEN CHEMISTRY

In developing countries, the introduction of green chemistry is still in a stage of infancy, despite the significant role it can play. Many of the practices in developing countries are still far from the concepts of safety, pollution prevention, and design of energy efficiency. Environmental pollution and waste generation are some of the aching problems many developing countries are suffering from. Many of the reasons behind these problems lie in policies and strategies adopted that are based on end-of pipe treatment. Most frequently, income generation activities are dependent on an efficient use of energy and other resources, such as water, which may pose some serious problems to future generations. (Anastas*, et al*., 1998)

VIII. DEVELOPING GREEN CHEMISTRY IN NIGERIA

Nigeria is confronted with several peculiar challenges which make a green agenda appear unattainable. The top of these include the solutions that have been adopted because of the inefficiencies in the energy and transportation systems, as well as waste management. The building industry also has its peculiar handicaps.

But with the application of chemical science and growing understanding and ability to manipulate chemical molecules chemists have contributed significantly to the advancement of technology through ways such as synthesizing crop-enhancing agricultural chemicals to ensure constant and viable food supply. Pharmaceuticals and chemical pesticides are also developed.

IX. THE ROLE OF CHEMISTRY IN NIGERIAN INDUSTRIES

Generally, green chemistry has major contributions to make to the quality of life, human welfare, and sustainable development. However, before green chemistry can contribute fully to these areas, it must be integrated into the discipline of chemistry, itself. This requirement presents a number of major challenges to the chemical profession. Chemical science has been practiced on an ever- increasing scale for decades. It has enabled the production of a wide variety of goods that are valued by humans. These include such things such as pharmaceuticals, fertilizers, semi conductors and other electronic devices. Without the persistent effort of chemists and the enormous productivity of the chemical industry, nothing approaching the high standard of living enjoyed in the modern industrialized societies would have been possible. (Stanley, 2004)

X. CONCLUSION

With the ever-growing human population, environmental pollution, depletion in supply of non-renewable energy sources, high cost of living, and incessant power failures, Nigeria needs an alternative energy source, more environmentally friendly products, and processes that are more reliable, safer, secure, and affordable. Research and development in green chemistry is the only key to an industrialized, technologically advanced, economically vibrant, and safer Nigeria.

REFERENCES

[1] Anastas, P. T. & Warner, J. C. (1998). *Green Chemistry: Theory and Practice*. New York: Oxford University Press.

[2] National Research Council. (1999). *Our Common Journey: A Transition toward Sustainability*. Washington, D.C.: National Academy Press.

[3] Nigeria Energy Commission website. Pietro, T., Anastas, P.T., Black, D.S., Breen, J., Collins, T., Memoli, S., Miyamoto, J., Polyakoff, M., & Tumas, W. (2000). Synthetic Pathways and Processes in Green Chemistry: Introductory Overview.

[4] Pure Applied Chemistry. 72(7), 1207–1209

[5] World Commission on Environment and Development (WCED). (1987).

[6] *Our Common Future* (The "Brundtland" Report). Oxford: Oxford University Press. Suberu, M. Y., Mukhtar, A.S., Bashir N. (2012*). Renewable power generation opportunity from municipal solid waste: a case study of Lagos metropolis (Nigeria)*.

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[7] Journal of energy technologies and policy. 2 (2), 1-14.
[8] Lancaster, M.(2002).*Green chemistry,* introductory text, Royal society of chemistry Cambridge.
[9] Stevens, C.V., and R.G. Vertic, R.G., (2004*). Renewable resources*, J. kirley and sons, Clichester.
[10] Azapagic,A., Pundour, S., and Clift, R., (2004). *Sustainable development in practice*, J. Kirley and sons, Clichester. Stanley,M.E.(2004*). Environmental chemistry*, 8th edition, CRS Press/ Lewis Publishers, Boca Raton.

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