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"NANO MATERIAL AND ECOSYSTEM: POTENTIAL EFFECT AND INVOLVED PROCESS"

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"Nano Material and Ecosystem: Potential Effect and Involved Process"

Abstract: *There is the decline of environmental quality due to human action and natural processes. The quality of the environment is degraded due to the erosion of natural ecosystems due to human or natural processes as well as depletion of resources like air, water, soil. According to the United Nations, environmental degradation is the decline in the ability to meet social and ecological goals and needs. There are many nano particles in the environment which has effects in both way i.e. potential positive effects and*

negative effects. To study about the process involved in the ecosystem, special concern with nano particle is the main aim of current study. The researcher tried to find out the potential effect of nano material on eco-system and the involved process in it.

Key Words: *Environment, eco-system, nano particles, nano-material, human action etc.*

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Introduction: Some natural processes and human actions are the cause of environmental degradation. Overuse and continued use of natural resources is a major cause of environmental degradation. Human beings are using the natural resources as raw materials for the production of goods which is making their life very ease. With the increasing production of goods, natural resources are becoming more and more depleted. Also overuse of resources leads to waste generation. Excessive accumulation of waste impairs the health of living beings and creates social, economic as well as ecological problems. Soil and land degradation is due to permanent and harmful wastes exciting in the environment. Increased use of modern technology for production is also a cause of environmental degradation.

Increasing use of technology for the human development is challenging the nature and the natural sources of the environment. For example, the construction of large dams creates reservoirs but disturbs the balance of rocks and increases the salinity of the soil. Growing population contributes to environmental degradation. Increased population increases the demand for resources. However, due to limited resources, it was impossible to meet all the requirements. Every year the world's population is growing by 8.6 crore. The impact of ecology and nano particles is seen at huge level in the ecosystem. What are the nano materials and which are affecting factor on the eco-system is mainly studied in this research work.

Natural and Adventitious Nano-materials:

There is change in the environment of rural and urban sector as far as current geographical matters are concern. In urban atmospheres, diesel-

and gasoline- fueled vehicles and stationary combustion sources which have contributed for many years particulate material throughout a wide size range, including NPs, amounting to more than 36% of the total particulate number concentrations. In addition, there is a natural background of NPs in the atmosphere, although the total concentration is low compare to potential releases of manufactured NPs. Most of the researchers carried out in this area that have focused on ultrafine particulate material, including nano-scale particles, and their effects on human health, especially on respiratory systems. In soils, natural NPs include clays, organic matter, iron oxides, and other minerals that play an important role in bio- geochemical processes.

Nano Material in the Environment: The contemporary era is using the nanotechnology at the huge percentage. The corresponding increases in the use of nanomaterials in products in every sector of society which have resulted in uncertainties in the environment and its impacts on all lives on the earth. The objectives of this work are to introduce the key aspects pertaining to nano-material in the environment and to discuss what is known concerning their fate, behaviour, disposition, and toxicity, with a particular focus on those that make up manufacturing process of nano-material in this technical and global era including the nano-material exciting in the freshwater, marine, and soil environments. It illustrates the paucity of existing research and demonstrates the need for additional research. The need for standard reference and testing materials as well as methodology for suspension preparation and testing is the part of current study.

Nano-materials in the Environment:

There are different views by different scholars on the nomenclature associated with nanoscience and nanotechnology though there are a few documents which have been published in recent years. For the purpose of this review, the definition of a nanomaterial (NM), as adopted by the

British Standards Institution, the American Society for Testing Materials , and the Scientific Committee on Emerging and Newly- Identified Health Risks , is a material with one dimension under 100 nm. Within this group of materials, nanoparticles (NP), defined as materials with at least two dimensions between 1 and 100 nm, are particularly important. Nanoparticles have always existed in our environment, from both natural and anthropogenic sources. Nanoparticles in air were traditionally referred to as ultrafine particles, while in soil and water they were colloids, with a slightly different size range.

Applications of Nano-Materials: The Nano-materials are used in a variety of manufacturing processes such as:

a. It is used in the products and healthcare.

b. It is used in paints, filters, insulation and lubricants.

c. Nanozymes in healthcare are nanomaterials with properties similar to enzymes.

d. Nano-particles are used in the applications such as biosensing, biomizing, tumor diagnosis etc. Antibiotics and more.

e. Nano-materials are used in paints to improve UV protection, UV aging and ease of cleaning.

f. High-quality filters can be made using nanostructures; these filters are capable of removing particles as small as viruses as seen in water filters manufactured by Seldon Technologies.

g. The next generation of conventional MBR, the Nanomaterials Membrane Bioreactor (NMS-MBR) has recently been proposed for advanced wastewater treatment.

The Potential Impact of Nano Material on the Eco-system: Nanomaterials in the atmosphere are expected to be mainly related to sludge and soil (Bahasa etc. 200, Kline etc ... Examples of exposure pathways for nanomaterials through the atmosphere are inhalation by

humans and other respiratory species and aquatic life from water or sludge. The world is facing environmental challenges such as improving air, soil and water quality whereas nanomaterials is affecting environment in both sides i.e. positive and negative.

Positive Impact of Nano-material on Eco-system:

a. It can be used to clean the atmosphere.

b. It may help for efficient energy solutions such as nanomaterial-based solar cells.

c. Nanomaterials help many consumers improve the quality and efficiency of products. As a result, exposure to manufactured nanomaterials is increasing day by day.

d. Nanotechnology can help to improve the quality of water.

e. The use of nano-materials may be fruitful for remediation of water. are carbon nanotubes (CNTs), zeolites, nanoparticles of zero valent iron (ZVI), silver nanoparticles, etc.

f. Zinc oxide (ZnO), titanium dioxide (TiO2), tungsten oxide etc. nanomaterials can serve as a photo catalyst tools. This can oxidize organic pollutants into harmless materials.

g. Another nan0-material named TiO2 is the most preferred material because it has high photostability, high photoconductivity, easily available, inexpensive and non-toxic.

h. An antimicrobial effect can be seen in the Silver nano-particles.

i. Apart from it, there are several polymeric nano-particles which are used for wastewater treatment.

j. The properties of nanomaterials, especially their size, offer very different advantages over large quantities of materials.

k. Nanomaterials' versatility demonstrates their usefulness in terms of their ability to adapt to specific needs.

l. A nanomaterial has a high level praise that can increase the demand for their use in many industries.

m. The use of nanometrics in the energy sector is beneficial as it can make existing methods of energy generation.

n. Nano-materail is playing a vital role in the agricultural sector also.

Negative Impact of Nano-material on the Eco-system:

There are very less studies that have shown the negative impact of nano-material on the ecosystem.

A. These studied declared that there is the environmental risk of manufacturing nano-materials.

B. When inhaled in the form of nanoparticles, they themselves can be toxic to things that are very harmful.

C. The effects of inhaled nanoparticles in the body can include pneumonia and heartburn.

D. **The Involved Process of Nano-material:** Nano-material can be created or they may have natural way of existence. It can be occurred naturally. In the process on Nano-material, Nanoparticles are formed from the gas phase by vaporizing the product material. This product material is using chemical or physical means the production of early nanoparticles, which can be in liquid or solid state and it is by homogeneous nucleation. In other words Nanomaterials are chemical substances which are manufactured at very small scale. Even Nanomaterials can be used at a very small scale. Further, they are developed to display novel characteristics which are compared to the same material without nanoscale features like increased strength, chemical reactivity or conductivity. There are several types of nano-material manufacturing. Few are given below:

a. **Nanoparticles Bases on Metal:** Semi-conductors, or oxides are metal baes nano-particles. Quantum dots, nano-wires and nano-rodes are examples of inorganic nano-material. the optical and electronic properties of nanomaterials which depend on their size and shape can be tuned via

synthetic techniques. Now—days nano-particles are extensively investigated in the field of biomedical for applications such as tissue engineering, drug delivery, biosensor.

b. **Bulk Nano-Materials:** nanocomposites, nanocrystalline materials, nanostructured films, and nanotextured surfaces etc are the examples of bulk nano-materials. They are manufactured in the bulk.

c. **Three D Nano-material:** Box-shaped Graphene (BSG) nanostructure is the best example of Three D nanomaterial. After mechanical cleavage of pyrolytic graphite, Box-shaped Graphene nanostructure has appeared. It has a multilayer system of parallel hollow nano-channels which is located along with the surface. It has a quadrangular cross-section. The channel walls are approximately equal to 1 nm in thickness as well as the width of channel facets makes about 25 nm.

Conclusion: Thus, as the change in technology is increasing rapidly, new nano-materials are invented by scholars and scientist. Environmental degradation due to the process is inevitable is there. Environmental degradation is likely to continue due to increasing population, increasing pressure on natural resources and declining environmental quality. However, with the careful implementation of advanced technologies and policies, environmental degradation can be reduced. In order to maintain the quality of the environment, serious action needs to be taken on a large scale to conserve resources. Humans have no control over natural processes. In such cases nano-material is playing a potential role with maximum positive impact on eco-system.

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