

# NANOTECHNOLOGY: A SMART WAY FOR WATER PURIFICATION AND TREATMENT

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**ABSTRACT:** Water consists of hydrogen and oxygen in the ratio of 2:1. It is one of the very important elements on this planet for survival. In human civilization, water always remained the top priority. An adequate allocation of pure water, which is free from diseases causing micro organisms, is the main necessity for a hale and hearty life, but water-borne diseases always played a major role in causing large number of casualties in nook and corner of the world. Now a days we are facing scarcity of pure water which may increase in the near future, so to overcome this problem, science has given the best solution by inventing nano technology. In nano technology, we use nano materials to remove the microscopic impurities, which we are not able to remove by other treatments. Nano-materials have gained special attention and special place in water pollution treatment since last decade. Titanium dioxide nano particles have emerged as promising photo catalysts for water purification, during the last decade. Various impurities which are present in the nanoscopic form are removed by using nanotechnology such as Carbon nano tubes and Alumina fibres for Water purification. This process is known as nanofiltration. The presence of contaminants in water samples can also be detected by using Nano-sensors.

The core benefit of Nano-filter is it passes water across the filter under less pressure. It is very effective, and it possesses more surface area and it can be simply washed by Black-flushing as we compare it with the traditional processes. [1]

**Keywords:** Nano-technology, Waste Water Treatment, Nano-materials, Anti-microbial function.

## 1. Introduction

Earlier, when scientific experiments were performed, the scientists were not able to detect various problems because of the small size of the particles they were dealing with. This was because the equipments they were dealing with were not of that particular range. So, there was a need to invent new technology to deal with the nano size range.

Nanotechnology is a form of technology which works on the application of very minutes particles which are in the size of 1 to 100 nanometres. Nanotechnology has various applications in various fields. In medical science, it is being used in the treatment of cancer, in the treatment of heart related problems, etc. It has a lot of applications in the other fields too like it is being used in textile industries, in constructions and in water treatment field also.

From centuries, scientists were trying to work with nano sized particles but they were not able to see the configuration of these particles and this was the main barrier in their work. Later on, new devices were developed that were able to display the small particles too.

Nanotechnology has a lot of applications in the modern era. Now-a-days, Nanotechnology is being used in medical treatment, medical equipments, in water purification, air purification, electronic equipments, etc.

For the solutions to various problems in water Nanotechnology is being used. One such problem is the Industrial waste and the way to remove it, such as the ways to clean underground water. To make water less harmful, nano particles such as zeolite are used to transform the contaminating chemicals by chemical reactions. This method is seen as one of the most conventional method to treat underground water as it reaches to contaminants easily. This method has replaced the earlier method of treating underground water in which pumping out of water is required for treatment.

## II. Nano-technology and water treatment

Water covers 70% of our planet, and people mostly think that it is in abundant. The availability of water which we use in our daily life for basic needs is extremely rare. The presence of fresh water is only 3% out of which only little amount of water is available as surface water and rest of it is stored underground and in glacier form.

Around 1 billion people all over the world are not able to use fresh water for their daily needs. One of the major problems for 2.5 billion people around the world is lack of sanitation. As a result of this, they are facing many diseases like Amoebiasis, Shigellosis, malaria, etc. Due to diseases like diarrhoea around 2 million people pass away every year. [2]

If the present consumption speed of water continues then it will lead to shortage of water in future. By 2029, 2/3 of the world's inhabitants will suffer from water shortage [3] The major effect of this will be on the ecosystem.

So, to overcome this problem, scientists came with a best solution by inventing nano technology.

Various impurities that are present in nanoscopic form are removed by using nanotechnology such as Carbon nano tubes and Alumina fibres during Water purification. This process is known as nanofiltration. The presence of contaminants in water samples can also be detected by using Nano-sensors. [4]

It depends on the purification stage of water that how much impurities nano technology can face when the process is applied. The charged particles, bacteria and other pathogens can be easily removed by this process. With the help of nanotechnology, we can easily remove the poisonous elements like Arsenic, and other liquid impurities. [4]

Carbon Nano tube Membranes can easily eliminate various suspended impurities from water. These suspended impurities are in the form of virus, bacteria, oil, etc. They possess minute pores due to which the rate of flow of fluid in them is faster than the rate of flow in the larger pores. This is possible only due to smoothness in their interior parts.

### III. Anti-microbial activity of Nano particles.

The surface water which is in the form of lakes, ponds, etc. is mostly affected by microbes which are present in it. These microbes are responsible for various diseases which can cause serious deadly illnesses in all the living beings.

The size of microbes is much larger as compared to nano particles. When water containing microbes passes through the Nano materials, then these microbes get trapped due to their larger size and the filtered water flows out through these Nano materials. Thereby, it plays a vital role in the filtration of water from disease causing micro organisms.

One such process is Bio-mineralization in which the bio-synthesis of nano particles is dependent on many organisms like bacteria, fungi, yeasts and algae. Nano particles of Ag, Au, Pt, Mn, Se, Fe, etc. are precipitated by these organisms. [3] *Aspergillus flavus* was proficient for the creation of extra cellular silver nano particles. As a result, researchers have considered silver nano particles have good effect against many types of bacteria, viruses and other disease-causing micro-organisms for the drinking-water treatment, which is mostly reliant on a high surface area to volume ratio having special chemical, physical and biological properties. [5][6]

### IV. Conclusion

We studied various papers regarding the application of Nanotechnology and tried to represent them in single paper. The development and research in the field of nanotechnology is very effective for the purification of waste water which is beneficial to human beings. This technology is quick, reliable, and long-lasting to purify waste water by destroying particular types of impurities from impure water.

It is the latest form of technology in the field of water treatment but it is not affordable to common people. So, there is a need to make it affordable to them. A lot of portion is covered by it today and will cover up more in coming years on which the scientists are continuously working.

### V. Acknowledgment

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### VI. References

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