Journal of Analysis and Computation (JAC)
(An International Peer Reviewed Journal), www.ijaconline.com, ISSN 0973-2861
Volume XVII, Issue II, July-Dec 2023

Micro plastics in Waste Water Treatment Plants: Detection, Occurrence, and Removal

[1]Dr. Rekha Mithal, [2]Mr. Amit Mithal, [3]Arin Jain, [4]Anuj Kumar

[1]Professor, Department of Chemistry, JECRC Jaipur

[2]Associate Professor, Department of Computer Science, JECRC Jaipur

[3]First Year student, JECRC Jaipur

[4]First Year student, JECRC Jaipur

Abstract

Microplastics in wastewater treatment plants (WWTPs) have become a growing concern in recent years due to their persistence in the environment and potential harm to human health and wildlife. The presence of Microplastics in wastewater treatment plants (WWTPs) is increasingly recognized, and this review paper summarizes the current state of knowledge on Microplastics in (WWTPs), including their sources, occurrence, removal efficiency, and potential consequences. The paper highlights the need for further research to fully understand the impact of Microplastics on (WWTPs) and the environment.

1 Introduction

Microplastics are defined as particles less than 5mm in size and are increasingly recognized as a significant contributor to global plastic pollution. They are present in various environments, including the oceans, freshwater systems, and even the atmosphere. With the increasing use of plastics, the account of Microplastics entering wastewater treatment plants (WWTPs) has increased significantly.

A recent study indicated that wastewater treatment plants (WWTPs) potentially played an important role in releasing Microplastics to environment(Brown etal.,2011). Microbobes added into the facial cleanser, toothpaste can be directly discharged into wastewater through human activities.(cheung and fork,2017:fendall and sewel ,2009).

The issue of releasing Microplastics from (WWTPs) is getting attention from various publications, with the numbers going exponentially in the last three years according to the publication search in the database of "Web of Science", http://apps.webofknowledge.com/ (Fig.S1(A), Supporting Information). However, the efficiency of Microplastic removal in (WWTPs) is not well understood, and there is growing concern about the potential for Microplastics to harm the environment and human health.

The purpose of this review paper is to summarize the current state of knowledge on Microplastics in (WWTPs), including their sources, occurrence, removal efficiency, and potential consequences, and to highlight the need for further research in this area.

2 Techniques for Microplastics Detection in WWTPs

The detection of microplastics in WWTPs is typically done through the use of optical microscopy, Fourier transform Infrared (FTIR) spectroscopy, and Raman spectroscopy, and is applied according to sample characteristics , since microplastics can be present in both wastewater and sewage sludge. microplastics are readily detected in both the 'influent' and 'effluent' of (WWTPs).

3 Removal of Microplastics in WWTPs

Removal of microplastics from WWTPs is a challenging task and a number of physical, chemical, and biological treatment methods have been explored. Physical methods, such as screening and filtration, are effective in removing larger microplastics but have limited effectiveness in removing smaller particles. the overall microplastic removal efficiencies of WWTPs without tertiary treatment were above 88 percent and the number increased to

over 97 percent in WWTPs as reported by leslie etal.(2017) was relatively low possibly because they collected only 2L of wastewater for..

Chemical methods, such as flocculation and adsorption, can effectively remove microplastics, but can also generate secondary pollutants. Biological methods, such as biodegradation and bioreactor systems, hold promise for the removal of microplastics from WWTPs, but further research is needed to fully understand their effectiveness and limitations.

4 Coclusion

WWTPs are a critical point of control for microplastics, as they are designed to remove pollutants from wastewater before it is discharged into the environment. In this paper detection, occurrence and the various methods of removal of microplastics in WWTPs are comprehensively reviewed the key conclusions being:

1) Microplastics are a widespread contaminant in the environment and are present in high concentrations in wastewater, and There is a need for continued research and development of more effective and cost-efficient methods for removing microplastics from wastewater.

2)Wastewater treatment plants play an important role in removing microplastics from the

environment, but not all treatment processes are effective at capturing all types of microplastics.

5 Acknowledgement

This work was supported by JECRC Foundation, Mrs Rekha Mittal ma'am (prof. chemistry)

6 References

1) Jing Sun ,xiahu Dai, qilin Wang,Mark C.M. van Loosdrecht,bing-Jie Ni "Microplastics in wastewater treatment plants : Detection occurence and removal"

2) Database of "Web of Science"