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Mookambigai College of Engineering, Keeranur, Tamil Nadu, India

Removal of Microplastic from Textile Effluent by using Granular Filtration Methodology

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ABSTRACT: Textile effluent microplastics generate extensive environmental contamination because they are persistent and of small size. This research aims to remove microplastic through granular filtration, using sand, gravel, and activated carbon as filter materials. The technique was successful in lowering turbidity, suspended solids, and microplastic composition in effluent. Findings indicate that granular filtration is an easy, inexpensive, and environment-friendly method of reducing microplastic contamination and enhancing wastewater quality.

KEYWORDS: Microplastic removal, textile effluent, granular filtration, sand filtration, gravel filtration, activated carbon, wastewater treatment, suspended solids, turbidity reduction, water quality improvement.

I. INTRODUCTION

Textile manufacturing produces significant quantities of wastewater with dyes, chemicals, and microplastics—small plastic particles smaller than 5 mm discharged during washing and processing of man-made fibers. Microplastics are non-biodegradable and can easily filter through traditional treatment systems, resulting in severe environmental pollution and risks to aquatic life and human health.

To solve this problem, granular filtration provides a low-cost and effective solution. By applying layers of gravel, sand, and activated carbon, the process physically captures microplastic fragments and suspended solids in textile effluent. It is inexpensive to maintain, simple, and can be adapted into existing treatment systems to improve wastewater quality and prevent microplastic release.

II. SCOPE OF PROJECT

The aim of this research is to test the efficacy of granular filtration for microplastic removal from textile effluent. The work includes gathering samples of textile wastewater, preparing granular filter medium using sand, gravel, and activated carbon, and measuring water quality prior to and following filtration. Turbidity, total suspended solids, and concentration of microplastics are the parameters that are measured to test filtration efficiency.

The work focuses on designing a low-cost, green, and simple-to-implement technique which can be coupled with conventional wastewater treatment plants. The results can assist in optimizing textile mill effluent treatment and mitigating microplastic contamination of water bodies.

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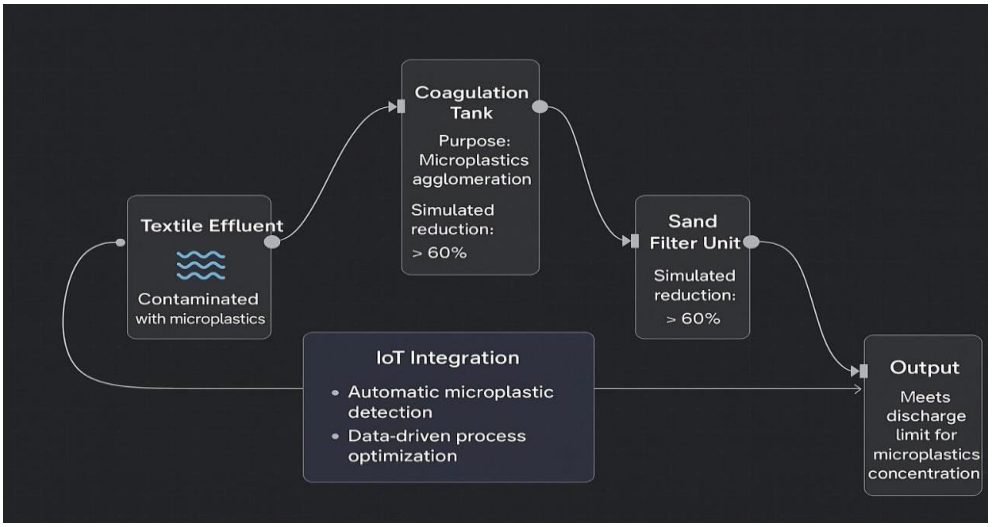
III. WORKFLOW SIMULATION OF N8N



IV. CONCLUSION

Granular filtration is an efficient and sustainable method for removing microplastics from textile effluent. Using media such as sand, gravel, ceramic granules, or recycled aggregates, microplastics are removed through straining, interception, and adsorption. The process is cost-effective, easy to maintain, and compatible with existing wastewater treatment systems. Its performance improves with optimized design parameters and advanced granular materials, making it suitable as a polishing step to enhance effluent quality and reduce environmental pollution.

V.ACKNOWLEDGEMENTS

We wholeheartedly acknowledge the support of our institution in granting the facilities and mentorship needed to successfully accomplish this project. Our deepest appreciation goes to our team members for their commitment, collaboration, and creativity during the study. We also acknowledge and appreciate the continuous support, encouragement, and guidance provided by our faculty, friends, and family. This project, **"Removal of Microplastic from Textile Effluent by Using Granular Filtration Methodology,"** was achieved through teamwork, ongoing learning, and a common approach to sustainable environmental development.

REFERENCES

ARTICLES:

1. Gambino I., Terzaghi E., Baldini E. et al. Microcontaminants and microplastics in water from the textile sector: a review and a database of physicochemical properties… Environ. Sci.: Processes & Impacts, 27, 297-319 (2025). https://doi.org/10.1039/D4EM00639A
2. Sirajum Monira, L. Fan, W. McCance, et al. Seasonal variation and removal efficiency of microplastics in wastewater treatment: a year-long study across three municipal water reclamation plants. Environ. Sci.: Water Res. Technol., 11, 1745-1757 (2025). https://doi.org/10.1039/D4EW00924J
3. Review article: Review and future outlook for the removal of microplastics by physical, biological and chemical methods in water bodies and wastewaters. Environ. Monit. Assess. 197, 429 (2025). https://doi.org/10.1007/s10661-025-13883-0

BOOKS:

4. Javid Ahmad Parray, Aparna B. Gunjal, Nowsheen Shameem, A. K. Haghi (2025) Microplastics Pollution Control in Water Systems: Practical Solutions
5. Izharul Haq, Maulin P. Shah (2025) Advanced Treatment Technologies for the Removal of Microplastics in Wastewater.

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CONFERENCE PAPERS:

6. Advanced Treatment Technologies for the Removal of Microplastics in Wastewater — Edited by Izharul Haq & Maulin P. Shah (CRC Press, 2025). Covers a range of advanced physical, chemical and biological methods for microplastic removal from wastewater, including industrial effluents. https://doi.org/10.1201/9781003379386

7. Fate of Microplastics in Wastewater Treatment Plants: Occurrence, Identification, Potential Factors, and Future Perspectives — Edited by Nitin K. Singh, Komal Jayaswal, Manish Yadav & Namita Maharjan (CRC Press, 2024). Focuses on microplastic behaviour in WWTPs, removal factors, modelling and fate in sludge & effluent streams.

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