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Improved water management system for toxic textile effluents developed

The technology has resulted in the recuperation of 50% of the treatment cost incurred from conventional processes for water treatment

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Indian researchers have developed an improved water management system that can completely reuse dye wastewater from textile industries, eliminating its toxicity and making it suitable for domestic and industrial usage, the Department of Science and Technology said on September 9. It can reduce water treatment costs and facilitate reuse of water in dry regions, it added. The current three-stage treatment process for wastewater consisting of primary, sec-

ondary, and tertiary treatment is unable to treat toxic industrial wastewater.

High cost

The stand-alone advanced oxidation process (AOP) treatment technique for colour and odour properties in industrial effluents (dye-based) may be insufficient to meet the set government standards and is also limited due to the high cost of AOPs involving continuous supply of chemical reagents.

It cannot remove the synthetic industrial dyes and the effervescent colour and



The process results in maximum colour removal and meets inland water discharge standards.

odour, which have a long-lasting carcinogenic and toxic effect on the ecological balance, especially aquatic life. In order to remove this toxicity, an upgraded solution with the AOP technology is the need of the day, it added. Working towards this, researchers from Indian Institute of Technology (IIT) Kanpur along with Malaviya National Institute of Tech-

nology, Jaipur, and MBM College, Jodhpur, have developed a modified AOP solution.

Modified process

This completely modified treatment process consisting of the primary dosing step, followed by the sand filtration step, another AOP and subsequent carbon filtration step.

It eliminates the need for the conventional primary, secondary, and tertiary processes, resulting in maximum colour removal, and meets the inland water dis-

charge standards.

The DST - Water Technology Initiative (WTI), along with the Indian National Academy of Engineering (INAE) - supported the development of this technology at pilot-level in collaboration with Laxmi Textile Prints, Jaipur.

The much-improved AOP technology targeting zero discharge water management system is being utilised for complete reuse of industrial dye wastewater for domestic and industrial usage at a rate of 10 kilo litres/day. The treatment of toxic

and highly carcinogenic industrial dyes of textile effluents is performed using this AOP technology for degrading and mineralising recalcitrant organic matter from effluent wastewater.

Low-cost solution

It is a direct replacement of the existing treatment plant processes and consists of a low-cost solution of dye adsorption on acid-modified soil, followed by a photochemical reaction step with a photocatalytic visible light filter and a unique carbon and PAN (polyacryloni-

trile) nano-mat fibre filtration process. Having been set up on a pilot basis, it remediates industrial wastewater.

The technology has resulted in the recuperation of 50% of the treatment cost incurred from conventional processes for water treatment (especially due to the high cost of sludge disposability) in the water-scarce regions of Rajasthan. Further, scaling up of this plant to 100 kilolitres/day capacity to meet the current industrial requirement is underway, it added.