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Occurrence of high priority Pharmaceutical residues in hospital effluent and its treatment by Sequencing Batch Reactors

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The hospital effluent is loaded with numerous chemicals, drug residues, hormones, personal care products, disinfectants, microbes, infectious fluids, pathogens, radioactives, nuclear medicine residues, etc. which adversely impacts the environment. The objective of this study is to analyze the hospital effluent with respect to some priority pharmaceuticals that are environmentally relevant. This study also highlights the treatment of these pharmaceutical residues in Sequencing batch reactor sewage treatment plant. The priority pharmaceuticals for this study have been identified on the basis of 12 parameters like consumption, toxicity, resistance to treatment, bioaccumulation potential, physicochemical properties, occurrence in environment, etc. The adverse impacts of these pharmaceuticals on aquatic environment have been discussed. The five selected pharmaceuticals belonging to different therapeutic classes are: Furosemide; a diuretic, Diclofenac; a non-steroidal anti-inflammatory drug, Carbamazepine; antiepileptic drug, antibiotics like Erythromycin and Ofloxacin. The residues of these pharmaceuticals have been analyzed in the hospital effluent of Delhi by using chromatography mass spectroscopy. The effluent samples have been taken from inlet, secondary clarifier and outlet from pressure filter of the treatment plant of the hospitals. The concentration of

diclofenac was maximum at the inlet that is around 7200 ng/L followed by ofloxacin which was 3400 ng/L and furosemide which was 2600 ng/L. The removal rate of ofloxacin is found 66% which is maximum among these five pharmaceuticals and minimum in case of carbamazepine i.e. only 18.7%. Thus, it can be inferred that pharmaceutical residues ranging from 34% to 82% is being discharged into the water bodies. The occurrence of these pharmaceuticals in water bodies poses a challenge for potable water supply and as they are not being currently regulated in wastewater effluents and/or drinking water. Thus, there is a need to identify the emerging contaminants and impart adequate treatment at the source to protect the water resources from contamination.

Speaker Biography

Aastha Dhingra was born and raised in Delhi, India. She has developed a passion for interdisciplinary approaches to solve the environmental challenges. Prior to joining PhD, she worked with Delhi Pollution Control Committee for three years. As part of her Ph.D. studies from the Department of Applied Science and Humanities, she focuses on quantifying emerging contaminants in the hospital effluent and the efficient technologies for treating the wastewater. She wrote an Environmental Handbook published by Department of Environment. She has recently authored a book titled as "Hospital Effluent: Emerging contaminants and treatment technologies" which is under publication. She has keen interest in issues relating to water management, waste management, bio-medical waste and health, wastewater treatment.

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