

IRRADIATION OF WASTEWATER WITH ELECTRON BEAM IS A KEY TO SUSTAINABLE SMART/GREEN CITIES

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The application of electron beam technology for the treatment of sewage water was carried out in this research work. The study was conducted to evaluate the disinfection potential of electron beam radiation (EBR) on sewage water. Results obtained at dose rate of 3 kGy per $\approx 50\mu\text{s}$ were shown to be more efficient for the disinfection of sewage water. At high dose rate of 6 kGy per $\approx 50\mu\text{s}$, the removal percentage of organic load in sewage increased up to 60% of its initial load and also showed a substantial improvement in waste water quality with an efficient decrease in organic load that lead to a better remediation process. On irradiation, the organic matter in sewage water will be degraded via transforming from complex to simpler molecular forms that are easily metabolized by native soil microflora during irrigation. The statistical correlation co-efficient analysis of the data has resulted in the significant r-values of the entire data i.e. $r>68$ which concludes the results to be positively significant and shows strong correlation coefficient. Therefore, this study emphasizes that the feasibility of electron beam radiation (EBR) for sewage water remediation. Further, our study defends that the ionizing radiation can be applied in two ways for treatment of sewage water: remediation at lower dose rate as well as substitution of chlorination at tertiary treatment process and reduction of sewage water's organic load at higher dose rate. Based on the results, it can be concluded that pollution mitigation using ionizing radiation (electron beam accelerators) is an eco-friendly alternative technology, without using chemical disinfectants ensuring robust life to mankind. Irradiated sewage water is fit for irrigation as well as use in industries which will be a promising solution to existing water demand and also a gateway to sustainable management of fragile fresh water resources for developing countries.

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