Analisis Kelimpahan dan Karakteristik Mikroplastik pada IPAL Domestik Teknologi Rotating Biological Contactor (RBC) = Analysis Of Abundance and Characteristics of Microplastics in Domestic Sewage Treatment Plant With Rotating Biological Contactor (RBC) Technology

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Abstrak

Mikroplastik merupakan plastik berukuran <5 mm. Dapat terbentuk secara primer (sengaja diiproduksi) dan sekunder (hasil degradasi). Penggunaan Personal Care Product (PCP) dan bahan-bahan pembersih rumah tangga menjadi jalur masuknya mikroplastik ke IPAL. Sampel air IPAL diambil dengan metode sampel komposit. Metodologi perhitungan kelimpahan pada sampel menggunakan mikroskop cahaya binokuler (visual), identifikasi jenis polimer menggunakan FTIR dan identifikasi ukuran mikroplastik menggunakan software J-Image. Kelimpahan rata-rata mikroplastik pada penelitian ini mencapai 8×103 MP/L. Penyisihan mikroplastik mencapai 77%. Hasil identifikasi karakteristik ditemukan bentuk mikroplastik fragment (57.6%), film (14.7%), beads (12.7%), foam (9.2%), dan fiber (5.8%). Warna mikroplastik yang teridentifikasi ialah biru (36.3%), hitam (35.1%), merah (18.2%), kuning (8.6%), dan transparan (1.8%). Persebaran ukuran mikroplastik pada IPALD terbagi menjadi terkecil <0.3 mm (80%), 0.3 – 0.5 mm (2%), 0.5 – 1 mm (4%), dan >1 mm (14%). Selannjutnya jenis polimer yang ditemukan pada IPALD tersebar dari Polyvinyl Formal, Polyvinyl butyral, Polycarbonate (PC) dan Poly (butylene terephthalate) (PBT), Polyester, Polyvinyl Chloride, Polyarylate, dan Tetrafluoroethylene-Hexa-fluoro-propylene (FEP). Hasil pengujian korelasi menunjukan hubungan yang kuat dan signifikan secara statistik untuk TSS terhadap Mikroplastik. Sedangkan hubungan lemah dan tidak signifikansi secara statistik untuk parameter VSS terhadap Mikroplastik di dalam IPAL.

.....Microplastics are plastics <5 mm in size. They can be primary (intentionally produced) and secondary (degradation). Its presence is difficult to detect and the potential dangers are still unknown, making it an emerging contaminant for humans and the environment. The use of Personal Care Products (PCP) and household cleaning materials is a pathway for microplastics to enter WWTP. WWTP water samples were taken using the composite sample method. The methodology for calculating the abundance of samples using binocular light microscopy (visual), identification of polymer types using FTIR and identification of microplastic size using J-Image software. The average abundance of microplastics in this study reached 8×10^3 MP/L. The removal of microplastics reached 77%. The results of the identification of characteristics found the form of microplastic fragments (57.6%), films (14.7%), beads (12.7%), foam (9.2%), and fiber (5.8%). The identified microplastic colors are blue (36.3%), black (35.1%), red (18.2%), yellow (8.6%), and transparent (1.8%). The size distribution of microplastics in WWTP is divided into the smallest <0.3 mm (80%), 0.3 - 0.5 mm (2%), 0.5 - 1 mm (4%), and >1 mm (14%). Furthermore, the types of polymers found in the WWTP were distributed from Polyvinyl Formal, Polyvinyl butyral, Polycarbonate (PC) and Poly (butylene terephthalate) (PBT), Polyester, Polyvinyl Chloride, Polyarylate, and Tetrafluoroethylene-Hexa-fluoro-propylene (FEP). The correlation test results show a strong and statistically significant relationship for TSS to Microplastics. While the relationship is weak and not statistically significant for the VSS parameter to Microplastics in the WWTP.