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Evaluation and Investigation of Advanced Oxidation System (Hydrogen Peroxide and Sodium Persulfate) in PAHs Contaminated Urban Sewage Sludge Treatment

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Abstract

This study has been carried out with the aim of evaluating treatability of polycyclic aromatic hydrocarbon compounds of PAHs available in urban and industrial sewage sludge utilizing advanced chemical oxidation method contingent on free sulfate radicals using hydrogen peroxide and heat activation methods. For this purpose, various parameters including (3, 5, 7, 9, & 10), persulfate's concentration (2, 10, 5, 15 & 20 mmol), the ratio of peroxide to persulfate (1, 0.5, 0.3, 0.2 & 0.1), sludge temperature (25, 35, 45 & 55° C) and the primary concentration of PAHs were considered at the 20-day reaction periods. Through making use of GC-MS, after 40- minute period, the quality and quantity of the compounds available in the sample were determined using a mass detector and the drawn standards' curve. After examining the effectiveness of eliminating PAHs compounds in various conditions, the chemical oxygen demand test (COD) was carried out for the samples related to optimal removal of PAHs compounds in order to determine the process' real efficiency in eliminating intermediate compounds originated from PAHs oxidation. The results demonstrate that advanced chemical oxidation method (persulfate-peroxide) can effectively result in PAHs compounds' elimination from the sludge.

Keywords: sewage sludge, advanced oxidation, persulfate, polycyclic aromatic hydrocarbons