

REMOVAL OF RADIUM-226 (^{226}Ra) FROM RADIUM-CONTAMINATED SOIL USING HUMIC ACID BY BATCH AND COLUMN WASHINGS

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The contamination of soil with radionuclides such as ^{226}Ra can be due to anthropogenic activities such as radioluminescence dial painting. With the half-life of 1600 years, the ^{226}Ra can persist in soil for a very long time, and consequently leading to long term implications on the environment as well as human health. This study discusses the removal of ^{226}Ra from radium-contaminated soil using humic acid extracted from a Malaysian peat soil. In batch washing, the removal of ^{226}Ra increased with the number of washing for both humic acid and distilled water. Nevertheless, the removal of ^{226}Ra using humic acid was higher than distilled water. Three successive washings with humic acid were required to remove all of the ^{226}Ra contained in the contaminated soil compared to five successive washings when distilled water was used. Meanwhile, in column washing, results obtained indicated low removal of ^{226}Ra (1 - 4 %). Leaching profile revealed that ^{226}Ra was bound to soil components with three different strength, thus resulting in three phases of ^{226}Ra removal.

Keywords: ^{226}Ra ; humic acid; soil; batch washing; column washing

ASSESSMENT OF WATER QUALITY STATUS IN GEBENG INDUSTRIAL AREA, PAHANG, MALAYSIA

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The study was conducted to assess the spatial variation of surface water quality in the Gebeng Industrial area, Pahang, Malaysia. Water quality parameters were analysed across the Tunggak River and surrounding area to disclose the spatial variation of the river water quality. Water samples were collected monthly from the selected 10 sampling site in the study area. The physico-chemical parameters were analysed using APHA & HACH standard methods as well as the selected heavy metals were determined using ICP-MS (Inductively Coupled Plasma Mass Spectrometry). The SPSS statistical software was used for data analyses. The study revealed that, the non-point source pollutants were associated with runoff from construction sites of newly developed industrial areas and the point source contributing the major pollutants especially from industrial wastes. Low levels of dissolved oxygen (DO) and higher concentration of chemical oxygen demand (COD), biochemical oxygen demand (BOD), total suspended solids (TSS), ammoniacal nitrogen and selected heavy metals made the water unusable. According to Interim National Water Quality Standard (INWQS), the major part of the river specially the mid-region was categorized as class V (very highly polluted) while some part was found to be in class IV (highly polluted) and rest of class III (polluted) as well. Based on Malaysian Water Quality Index (DOE-WQI), the maximum stations except lower and uppermost were in class IV, and highly polluted.

Keywords: Water quality parameters, Water quality index (WQI), Gebeng Industrial area