Maria Vilma Faustorilla et al., J Chromatogr Sep Tech 2017, 8:7(Suppl)
DOI: 10.4172/2157-7064-C1-037

Fractionation of total petroleum hydrocarbons in soil by SPE-GC for toxicity studies to *Eisenia fetida*

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As petroleum is a complex mixture of hydrocarbons, the ecotoxicity of petroleum-contaminated soils has been based mostly on the total petroleum hydrocarbon (TPH) load. However, a requirement of environmental fate and risk analysis is the separation of TPH into its aliphatic and aromatic components appropriately due to the toxicity differences between the fractions. This study developed a fractionation method for TPH in soil using solid phase extraction (SPE) technique followed by analysis utilizing gas chromatography (GC) coupled to mass selective detector and flame ionization detector systems. Validation results suggested that method performance are related to molecular weight, molecular structure and soil organic matter content; thus, providing important information on the behaviour of the individual hydrocarbons such as adsorption into soil which is significant in determining environmental fate and weathering of hydrocarbons. Three soil samples contaminated with aliphatic and aromatic components were collected to determine earthworm chronic toxicity. Lethality and sub-lethal effects on days 7, 14, 21 and 28 were investigated on *Eisenia fetida*. The toxicity studies showed that aromatic fractions exerted increased lethal effects upon concentration on earthworms occurring at lower concentrations as compared to the aliphatic fractions, which only showed adverse effects at higher concentrations. This work emphasized the need to determine the fractions of TPH in a contaminated soil, instead of using TPH as a single hydrocarbon index, to have a more accurate assessment towards ecological hazards and impact.

Biography

Maria Vilma Faustorilla obtained her Bachelor and Master of Science degrees in Chemistry from the University of the Philippines. She has accumulated many years of experience in R&D, QC, QA, Clinical and manufacturing environments in the pharmaceutical industry, having worked within various highly regulated environments that are NATA, TGA or FDA accredited. She is currently a PhD student of the University of South Australia in the environmental strand of the Future Industries Institute, which develop solutions to complex contamination problems.

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