

Identification of Residues of Petrol in Fire Debris in the Presence of Polyethylene Interfering Compounds

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Fire debris analysis is a process of identifying Ignitable Liquid Residues (ILR) from fire debris samples collected at a fire scene. However, analysis of ILR is a complicated task due to the petrochemical nature of fire debris containing synthetic polymer in the modern built environment. There, interfering compounds can mask trace levels of ILR while creating compounds that are similar to target compounds and cause false results when the analysis is done. One of the commonly found ignitable liquids is petrol and the main petrol target compounds are aromatics. Polyethylene (PE) interfering compounds mainly appear as a series of triplets of alkadiene, alkene and alkane. However, the identification of petrol residues is also somewhat difficult since PE-interfering compounds can produce more complicity to the chromatogram. This study aimed to recognize the petrol residues in fire debris in the presence of interfering compounds from PE since interfering triplets can mask these aromatic target compounds even though they are not similar to PE interfering compounds. The study comprises the analysis of control samples of consumer products made of PE that unburnt, pyrolyzed, and burnt as well as burnt simulated PE samples with various test volumes of petrol. The assessment was done by passive headspace extraction and GC-MS instrumentation. Aromatic target compounds in the petrol were unable to detect in petrol-spiked PE samples of 1 μ l and 3 μ l even Extracted Ion Chromatography (EIC) technique was used for the data analysis due to masking low abundant peaks. Since PE-interfering compounds are not identical to petrol target compounds, beyond 5 μ l, it was easy to detect all the aromatic target compounds even though the Total Ion Chromatogram (TIC) was taken into account. Therefore, PE interference does not affect the identification of considerable amounts of petrol.

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