Title : Conditions and Sample preparation of fuel (Gasoline and diesel) for Gas Chromatography Mass Spectrometry

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ABSTRACT

To investigate forensic evidence in fire cases and determine whether fuel or flammable chemicals were involved, Gas Chromatography-Mass Spectrometry (GC-MS) is employed. This tool is essential for analyzing the chemical state and transformations that may occur. Given the need to switch the type of column used in the GC-MS, challenges arose in reusing the original analytical conditions, requiring optimized adjustments for better performance. The conditions were modified, and the method's validation was carried out by evaluating linearity and precision. The results indicated that the adjusted method met all acceptance criteria, confirming its suitability for fuel analysis. Furthermore, this method can be applied to study the behavior of Gasohol 95 and Diesel B 7 fuels, providing guidance for forensic teams on the optimal time to collect evidence from the scene. In the behavior study, Gasohol 95 and Diesel B7 fuels from five suppliers PTT Station, Bangchak, PT, Shell, and Caltex were tested. These fuels were allowed to evaporate at room temperature in a controlled laboratory environment. The study found that gasoline ethanol 95 evaporated more effectively on glass than on paper, and after 8 hours, both the paper and glass showed a specific pattern for gasoline ethanol 95 that differed from the reference. In contrast, diesel B7 evaporated more effectively on filter paper than on glass, and after 20 hours, diesel B7 could still be analyzed on both the filter paper and glass. The study of the EIC (Extracted Ion Chromatogram) patterns from the analysis supports the decision-making process when dealing with minimal fuel residues. This ensures that analysts can determine whether the evidence contains fuel. Based on the findings it is recommended that crime scene investigators collect fuel-related evidence within 8 hours, as this is the window during which the analysis can still reliably identify the fuel according to reference.

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