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Methyl tertiary butyl ether in heavy hydrocarbon matrix: identification and quantification using gas chromatography headspace technique



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Statement of the Problem: Petroleum product slop generated in products distribution terminals contains different products handled within the terminal, specifically unleaded gasoline which contains MTBE (Methyl tertiary butyl ether) blended as additive. These slops are injected into the atmospheric residue stream feeding the refinery vacuum distillation unit as a recycling option. Due to this optional blending of MTBE containing slops to the Vacuum distillation (VD) feeds, there are concerns over possibility of MTBE carry over in the vacuum distillation products, which might have an impact on the hydrocracking catalyst and the quality of the products specifically naphtha. The objective of this case study is to determine the MTBE content in the vacuum distillation products like light vacuum gas oil and heavy vacuum gas oils (LVGO and HVGO). Since there are no standard test methods exists to determine the content MTBE in VD products. The purpose of this study is to develop a chromatographic method for identification and quantification of MTBE in heavy hydrocarbon matrices.

Methodology & Theoretical Orientation: Various heavy hydrocarbon matrices starting with light vacuum gas oil, heavy vacuum gas oil, and straight run residue were selected as representative heavy hydrocarbon matrix. Temperature conditions from 90°C to 180°C with an increment of 30°C were selected for study in GC-HS and optimized GC headspace parameters and GC parameters for all the matrices.

Findings: After the laboratory study using various heavy hydrocarbon matrices at various temperatures, it is observed that gas chromatography headspace technique can be used for the identification and quantification of MTBE. Also, derive a theoretical equation for the quantitation in specific matrix. Results obtained theoretically and practical measurements are well within the repeatability window of the gas chromatography headspace technique.

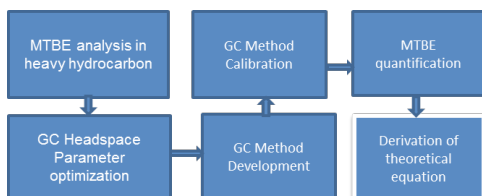


Figure-1: Schematic representation of MTBE analysis in heavy hydrocarbon matrix

Biography

Abraham George is working as the Section Head of Analysis at ADNOC Refining Research Centre. He has 25 years of experience in the area of Petroleum Inspection and Laboratory Analysis. He has completed his Bachelor's Degree in Chemistry and obtained his Master's Degree in Business Administration from Mahatma Gandhi University, India. He worked in various capacities in managing laboratories in India, Saudi Arabia and in UAE, and involved in inspection and analysis of entire range of crude Oil, petroleum products and other materials. He is a certified Lead Auditor in ISO 9001:2008 QMS from Lloyds Register Quality Assurance.

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