



E93 The Classification of an Ethanol Coeluting Compound Via Headspace Gas Chromatography (HS/GC)

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Learning Overview: After attending this presentation, attendees will understand how common inhaled anesthetics for general hospital anesthesia interact with routinely encountered volatile compounds.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating the issues that can arise with the presence of an inhaled anesthetic when analyzing a sample for ethanol concentration under HS/GC.

Blood alcohol analysis plays an important part in the legal realm. Alcohol analysis in a crime laboratory is performed to determine the concentration of ethanol present in a biological sample for criminal and death investigations. In driving under the influence cases, the ethanol concentrations are the basis for filing criminal charges. In a blood sample tested by the Canton-Stark County Crime Laboratory (CSCCL) for criminal investigation, an unknown compound coeluted with ethanol under HS/GC.

Based on the information provided by the investigating officer, the individual from whom the sample was collected was being prepared for surgery while the sample was drawn; therefore, the unknown compound was thought to be an inhaled anesthetic. Inhaled anesthetics administered during preparation for surgery are very volatile. Desflurane, isoflurane, and sevoflurane are commonly available inhaled anesthetics. These anesthetics were analyzed following the CSCCL ethanol analysis protocol used to determine Blood Alcohol Content (BAC), and it was discovered that sevoflurane had an almost identical retention time as ethanol. Sevoflurane was observed as a shoulder on the ethanol peak using the BAC1 column. Sevoflurane and ethanol completely coeluted on the BAC2 column, which was comparable to the casework sample analyzed by the CSCCL.

In addition, the three anesthetics were evaluated against other common volatile substances (methanol, isopropanol, and acetone) included with ethanol in the laboratory's volatile mixture standard. While sevoflurane coeluted with ethanol, the other two inhaled anesthetics coeluted with two other volatile compounds. Desflurane partially coeluted with methanol on the BAC1 column, but separation was achieved with the BAC2 column. Isoflurane appeared as a shoulder on the isopropanol peak, partially coeluting on both BAC1 and BAC2 columns.

By decreasing the temperature of the GC oven from 40°C to 26°C, separation was achieved between the sevoflurane and ethanol peaks. At this time, the method for the separation of the compounds was not able to be validated due to problems with the bias for the ethanol quantitation results. Future research would include improving the bias, performing a full-method validation, and separating the two compounds on different columns and instrumentation in order to observe any variation.

Ethanol Analysis, Inhaled Anesthetics, Coelution