Analysis of Blood Plasma for Ethanol by Gas Chromatography

References

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Goal

To determine the concentration of alcohol in blood.

Suggested Method of Analysis

Gas chromatography; aqueous injection

Preparation of standards and samples

Prepare aqueous standard solutions of ethanol and internal standard. The ethanol concentrations should cover the range expected for sober and impaired drivers. The internal standard concentration should be approximately equal to the average standard ethanol concentration and should be identical in each ethanol standard and in each sample.

Store aliquots of the standard and sample solutions in glass vials fitted with open screw caps and teflon-lined septa. To preserve the solutions for up to one week, tightly seal the vials and store the solutions in a refrigerator.

Gas chromatographic analysis

Follow instructions to set up the gas chromatograph for split injection of the sample and isothermal separation in a polar column. By experiment, determine the highest oven temperature that gives baseline separation of the peaks.

Perform the analysis in the following manner. Push the syringe needle through the vial's septum. Slowly fill and rapidly empty the syringe several times to remove air. Fill the syringe with aqueous solution and set the plunger to the exactly 1 µL. Remove the syringe/needle from the vial, and then pull ~1 µL of air into the syringe. Immediately insert the syringe/needle into the GC injection port and inject the sample. Start the instrument and data acquisition. Record the peak areas for ethanol and internal standard. Repeat the process for each vial.

Use the peak areas and ethanol concentrations to construct an internal standard calibration line, and then calculate the concentrations of the standard reference material and samples. Calculate uncertainties for all final quantitative values.