Colorado State University

CHEM 431
Instrumental Analysis Laboratory

Notes for
Gas Chromatography
Principles and Applications

The following is a set of short notes to outline the experiment in question and to provide helpful guidance to those executing the experiment.

A. Instrumentation for gas chromatography (GC) is comprised of well-defined components, each of which contributes to the overall chromatographic performance. The key parts are a source of gas for the mobile, an inlet or injector to deliver the sample to a column, a column containing a stationary phase where separations occur, an oven to control the column temperature, and a detector to register the presence of a chemical analyte exiting the column end. A computer controls many facets and details of the instrument operation and data presentation.

B. B. In this experiment the basic setup, that is, preparation of solvents and preparation of suitable analytic samples, and operation, that is, software control, of a modern, integrated and powerful GC system will be demonstrated and used.

C. Always select wash solvents accordingly and carefully. Ensure the syringe is fully cleaned of the last sample and any residual wash solvent in the syringe does not interfere with the following measurement.

D. Always select methods used to ensure all components of one measurement are completely eluted from the column.

E. Alcohols in *i*-octane – prepare a solution of several small chain alcohols (MeOH, EtOH, PrOH, etc) at a concentration of 1 mg/mL (each) in *i*-octane. Ou an use additional alcohols at your own pleasure. Run a short time method, such as a twelve minute temperature programmed one. Confirm that twelve (12) minutes is sufficient to elute the *i*-octane from the column.

F. Learn to transfer data from the chromatograph into Igor Pro.

G. Observe the utility and methods of using a logarithmic Y-axis presentation.

H. Alkanes in methanol – prepare a solution of up to ten straight chain alkanes (for example C_8 through C_{20}, by 2 at a concentration of 1 mg/mL (each) in methanol. Run a twenty (20) minute, programmed temperature method.

I. Methanol in *i*-octane – prepare a series of solutions (1 mL each, directly in GC vials) of methanol at various concentrations in *i*-octane. Use a series of concentrations in a logarithmic fashion to cover several orders of magnitude. For example, tens of ug/mL trough tens of mg/mL with more than one concentration in each decade.

J. Note the several different effects of high and low concentration on the column and detector.