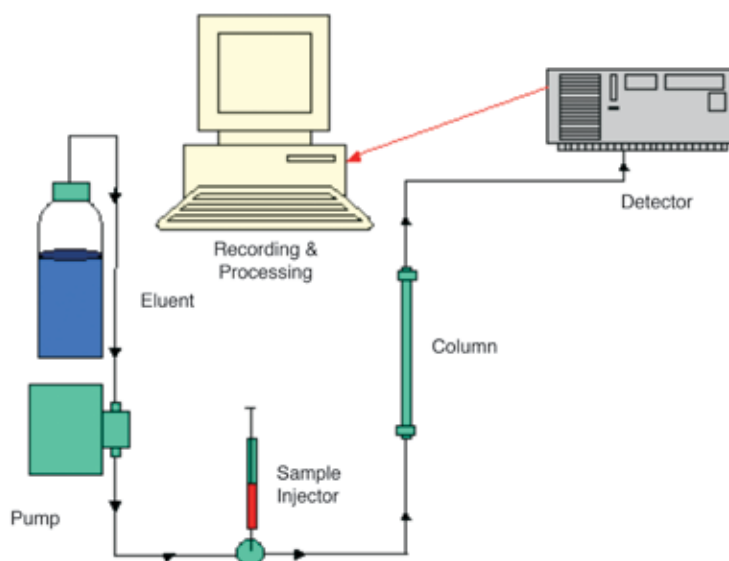




## Liquid Chromatography

AGVISE employs many scientific methods to determine the concentration of elements in the soil and water samples it receives. One of the instruments we use routinely to determine anions in water samples is a liquid chromatograph. Chromatography is a laboratory technique where mixtures of chemicals are separated into their individual compounds and elements. The basic principle of chromatography is that different compounds and elements will stick to a solid surface or dissolve in a film of liquid to different degrees.

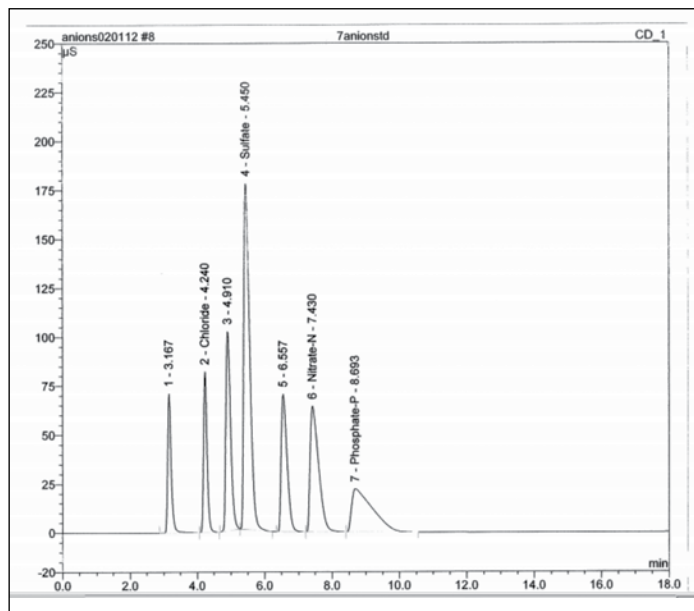
All liquid chromatographs have the 5 basic components. The components consist of a pump, a sample injection system, a column, a detector and a recorder. (See Diagrams) The pump generates a flow of eluent from a solvent reservoir into the instrument. An eluent is a substance used as a solvent to separate materials. The eluent used in the instrument will vary depending on what element or compound we are analyzing for. Eluents can vary from acidic to basic solvents.



The injection system of the instrument is typically placed next to the pump. The purpose of the injector is to introduce the sample into the eluent stream. The simplest injection method used is a syringe. Most systems have a carousel for holding the samples and the injection takes place robotically.

Figure 1

From the point of injection the eluent and the sample travels into a separation column. The column is the heart of a liquid chromatography system. Columns are narrow tubes filled with a resin that is designed to retain compounds and elements for a period of time. Different compounds will be retained on the resin for a longer period of time than other compounds. The length of time it takes an element or compound to leave the column and reach the detector is known as the retention time. Figure 1 illustrates the length of time it takes some common anions to reach the detector in our instrument.



After the separation of analytes is performed inside the column, the instrument's detector is used to observe the obtained separation. An analyte is a substance or chemical constituent that is of interest in an analytical procedure. The composition of the eluent is consistent when no analytes are present. The presence of an analyte changes the composition of the eluent. The detector has the capability to measure these differences. The detector we use to measure ions in water samples is called a conductivity detector.

The change in eluent as detected by a detector is in the form of an electronic signal. In older days a pen and paper chart recorder was used to display the output of the detector. Today a computer is used to capture the signal and process the data. The computer has the capability to correct baseline, calculate concentrations, and determine molecular weights.

Currently we use the liquid chromatograph to test for bromide, fluoride, nitrate, sulfate, chloride, and phosphate in water samples. Liquid chromatography technology has the capability to test many other charged anions, cations and compounds. If you have a project that requires ion detection, please give us a call and see if we can put our liquid chromatography system to work for you.

