Ion Chromatograph Standards
Environmental Analysis 2010

EPA method 300 describes the use of ion chromatography for analysis of natural and waste waters. In this method the authors describe how to prepare a high, intermediate, and low range standard. The high range standard is prepared from 1000 mg/L stock solutions. The intermediate and low standards are prepared by diluting the high and intermediate standards respectively. For the high range standard the method recommends the following concentrations in mg/L: chloride 10, nitrate 30, phosphate 50, sulfate 100. Intermediate standard is made from a 1:10 dilution of high standard, and low standard is made from a 1:4 dilution of intermediate standard. This approach is useful because it saves a great deal of pipeting. We will modify the method as follows:

Prepare 500 mL of a stock solution that contains:

Chloride 1000 mg/L
Nitrate -N 1000 mg/L
Phosphate –P 2000 mg/L
Sulfate 2000 mg/L

The calculation of masses required should be completed before the beginning of laboratory. Note that each of the above concentrations possesses only one significant figure. When you weigh your primary standards on an analytical balance you will obtain 4 - 6 significant figures. The volumetric glassware is good to 4 significant figures. Do not attempt to weigh the exact amount of reagent needed to make your solution. Rather, weigh an amount close to that which is needed and record the actual mass as accurately as possible. Then, calculate your actual concentration based on the true mass. You will end up with numbers like 1019 mg/L Cl. The number of significant figures should reflect the actual accuracy of your method and not the number of digits on your calculator.

Use NaCl, $NaNO_3$, KH_2PO_4, and K_2SO_4 that have been appropriately dried. Once you have made the stock solution, dilute it as described below to prepare a high, medium, low, and zero standard. A zero concentration standard should be prepared using the same deionized water from which you prepared the other standards.

High-Range Standard. Use a 10 mL transfer pipet and a 1000 mL volumetric flask. Rinse the transfer pipet with stock solution and then transfer 10.00 mL of the stock solution to the volumetric flask and dilute to 1000 mL. Store 100 mL of the solution.

Intermediate-Range Standard. Using a ___ mL transfer pipet and a 100 mL volumetric flask, transfer _____ mL of the High-Range standard to the volumetric flask and dilute to 100.0 mL.

Low-Range Standard. Using a ____ mL transfer pipet and a 100 mL volumetric flask, transfer ____ mL of the Intermediate-Range standard to the volumetric flask and dilute to 100 mL.

	High-Range (mg/L)	Intermediate Range (mg/L)	Low Range (mg/L)	Zero concentration (mg/L)
Chloride	10	1.0	0.25	0.00
Nitrate –N	10	1.0	0.25	0.00
Phosphate –P	20	2.0	0.50	0.00
Sulfate	20	2.0	0.50	0.00

Properly label the bottles and store the solutions in a refrigerator.