

Hexavalent Chromium by Flow Injection Analysis (FIA)

FLOW INJECTION ANALYSIS (FIA) SERIES

Cartridge Part Number: 331544CT

Channel Part Number: 331543

Scope and Application

This method is used for the determination of hexavalent chromium in water, from groundwater to industrial wastes. The Method Detection Limit (MDL) is 0.0011 mg/L hexavalent chromium. The applicable range of the method is 0.01 - 10 mg/L hexavalent chromium. Optimal performance is obtained for samples with a hexavalent chromium concentration of < 1-mg/L by calibrating in the range of 0.01 - 1.0 mg/L. The range may be extended to analyzer higher concentrations by sample dilution.

Method Performance

Range	2 - 5000 µg/L
Rate	50 samples / hour
Precision	<1% RSD at mid-point range
Method Detection Limit (MDL)	0.2 µg/L

Summary of Method

- Hexavalent chromium reacts with diphenylcarbazide in an acidic solution to form a red-violet colored complex. The absorbance of chromium-diphenylcarbazide product is measured at 540 nm. For reagent preparation refer to Appendix A.
- The quality of the analysis is assured through reproducible calibration and testing of the Flow Injection Analysis system.
- A general flow diagram of the FIA system is shown in Figure 1.

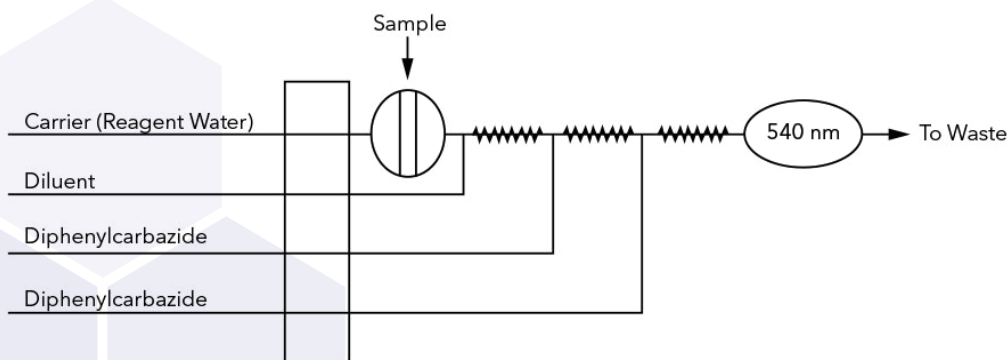


Figure 1. General flow diagram of the FIA system

Reagents and Calibrants

Table 1. Reagents and Calibrants

Chemical Name	CAS #	Chemical Formula	Part Number
1,5-Diphenylcarbazide	140-22-7	$C_{13}H_{14}N_4O$	
Isopropanol, 99%	67-63-0	C_3H_8O	
Potassium Dichromate	7778-50-9	$K_2Cr_2O_7$	
Sulfuric Acid, Concentrated	7664-93-9	H_2SO_4	
Deionized Water (ASTM Type I or II)	7732-18-5		

Interferences

- Hexavalent molybdenum and mercury salts in concentrations greater than 200 mg/L interfere.
- Vanadium interferes in amounts greater than 10 times the concentration of chromium.
- Remove interfering amounts of molybdenum, vanadium, iron, and copper by extracting metal cupferrates into chloroform. Do not use this method unless it is necessary, because it may cause complications with the oxidation step of this assay.
- Eliminate interference from permanganate by reduction with azide.

Figure 3. Hexavalent Chromium Calibration Series (0.01 - 1.00 mg/L)

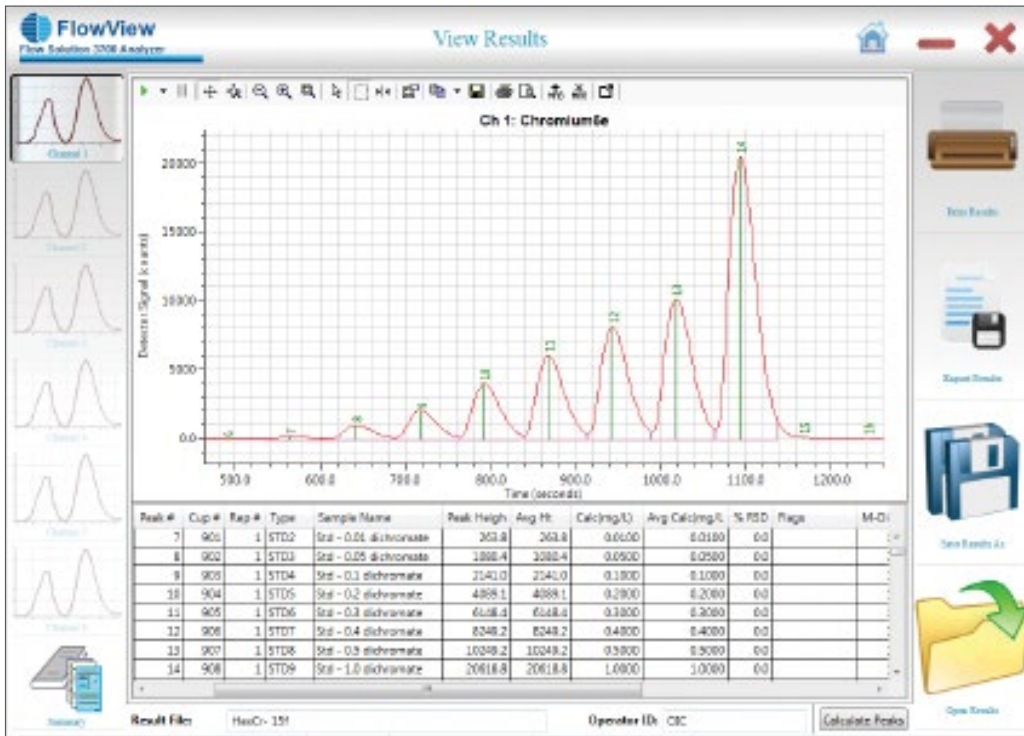


Figure 4. Hexavalent Chromium Calibration Series (0.5 - 10.00 mg/L)

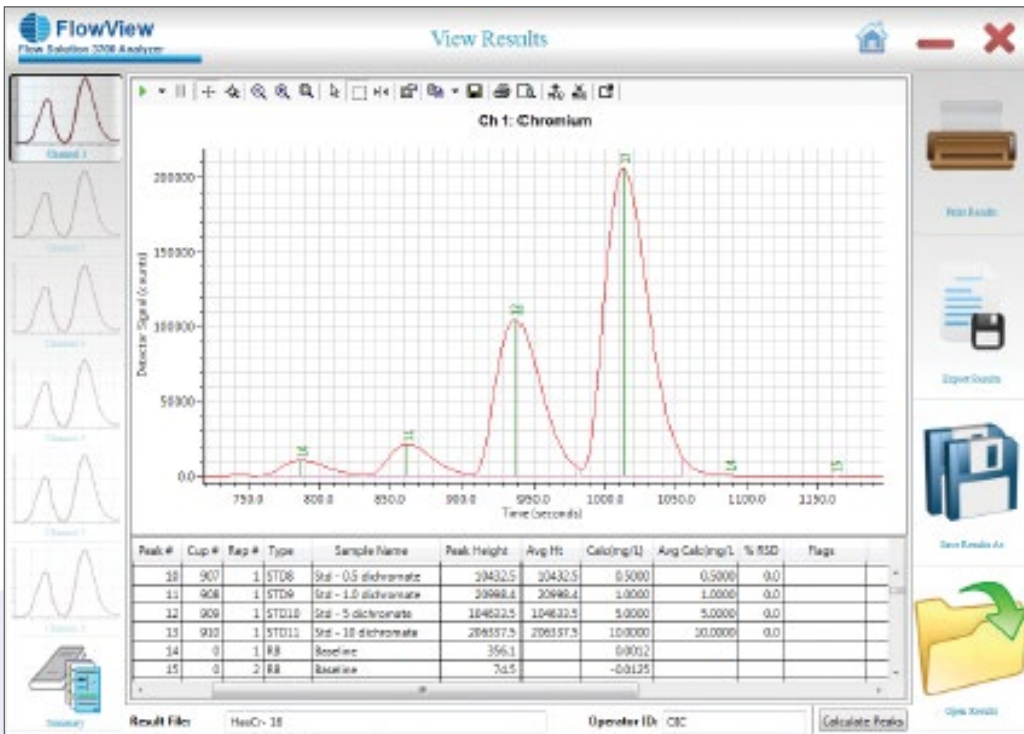
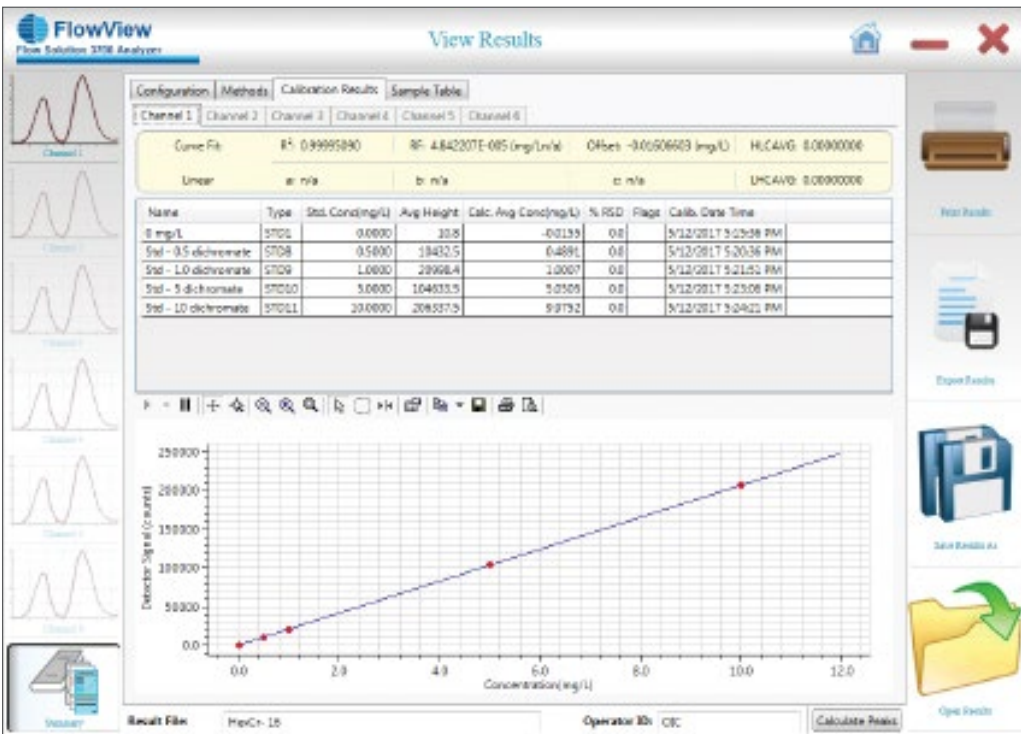


Figure 5. Calibration Curve and Statistics (0.01 - 1.00 mg/L)



Figure 6. Calibration Curve and Statistics (0.5 - 10.00 mg/L)



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