

Hexavalent Chromium Determination

Hamilton PRP-X100 Anion Exchange HPLC Column

Chromium (Cr) is a metal with an interesting relationship to the environment. Whereas trivalent chromium (Cr(III)) is an essential nutrient, hexavalent chromium (Cr(VI)) is a poison to humans and aquatic life and poses serious environmental and ecological threats. Recent studies of various ground and drinking water sources have detected toxic levels of Cr(VI). This dangerous trend has gained the attention of national and worldwide health organizations, such as the United States Environmental Protection Agency (EPA) and the US Food and Drug Administration (FDA), who seek to understand how widespread the problem is. The California Department of Public Health included Cr(VI) as an unregulated chemical requiring monitoring in 2001. Based on recent data, 3,107 of 6,565 public wells in Los Angeles, San Bernardino and Fresno counties had Cr(VI) concentrations above 1 µg/L. A Public Health Goal of 0.02 µg/L was published in July 2011.

Analysis of chromium species is made challenging due to the nature of the element and diverse sample matrices. Because chromium exists in two oxidation states, it is important to differentiate between the nutrient, Cr(III), and the poison, Cr(VI) in samples. An (HPLC-ICP-MS) method using the Hamilton PRP-X100 has been developed in order to determine relative abundance of Cr(III) and Cr(VI) in diverse sample matrices.

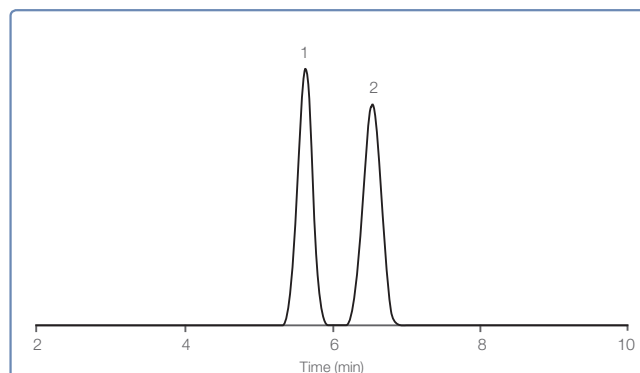
Trivalent chromium (Cr(III)) is stabilized as a chelation complex by incubating the sample at 70 °C in 0.2 mM EDTA. The Cr(III)-EDTA complex is suitable for binding to an anion exchange resin. Resolution of the two species then becomes a straight forward isocratic separation. Although UV and conductivity are suitable for detecting chromium species, inductively coupled plasma-mass spectrometry (ICP-MS) is the method of choice for trace analysis.

PRP-X100 HPLC Column Ordering Information

Column Type	Hardware Size (mm)	Particle Size		
		5 µm	10 µm	12 – 20 µm
PRP-X100	2.1 x 150 PEEK	79852		
PRP-X100	4.6 x 150 PEEK	79174	79354	
PRP-X100	4.6 x 250 PEEK	79181	79455	
PRP-X100	Bulk Resin (1 Gram)	79584	79585	79586

PRP-X100 HPLC Guard Column Ordering Information

Part Number	Description
79383	Analytical Guard Column Starter Kit (1 holder, 2 cartridges), PEEK
79385	Analytical Guard Column Replacement Cartridges (5/pk), PEEK



1) Cr(VI) and 2) Cr(III) EDTA separation on Hamilton PRP-X100

Experimental Conditions

Column: Hamilton PRP-X100, 5 µm, 4.6 x 250 mm

Part Number: 79181

Flow Rate: 1.0 mL/min

Mobile phase: 2 mM (NH₄)₂CO₃ for 0 – 3 min

40 mM (NH₄)₂CO₃ for 3 – 14 min

2 mM (NH₄)₂CO₃ for 13 – 17 min

Injection Volume: 50 µL, 100 µg/L of each standard

Detection: ICP-MS

For more information on Hamilton HPLC columns and accessories or to order a product, please visit www.hamiltoncompany.com or call (800) 648-5950 in the US or +41-81-660-60-60 in Europe.