

Chromium

For water and wastewater

Total and Hexavalent Methods

Introduction

Chromium may be present in water as the hexavalent (chromate) or the trivalent form, although trivalent chromium rarely occurs in potable water. Hexavalent chromium enters a water supply through industrial wastes from metal plating baths and from industrial cooling towers where chromate is used to inhibit metal corrosion. Chromium is an objectionable contaminant in public drinking water supplies due to its suspected carcinogenic effects. Chromium present in potable waters above a 3- $\mu\text{g/L}$ level indicates the possible presence of industrial wastes. Concentrations greater than 50 $\mu\text{g/L}$ are sufficient grounds to reject the water supply.

Chemical reactions

Hexavalent chromium

Hexavalent chromium is determined by the 1,5-Diphenylcarbohydrazide Method using a single dry powder formulation called ChromaVer 3™ Chromium Reagent. This reagent contains an acidic buffer combined with 1,5-Diphenylcarbohydrazide which reacts to give a purple color when hexavalent chromium is present. The method is applicable to fresh water and wastewater samples. Color development is directly proportional to the amount of hexavalent chromium present.

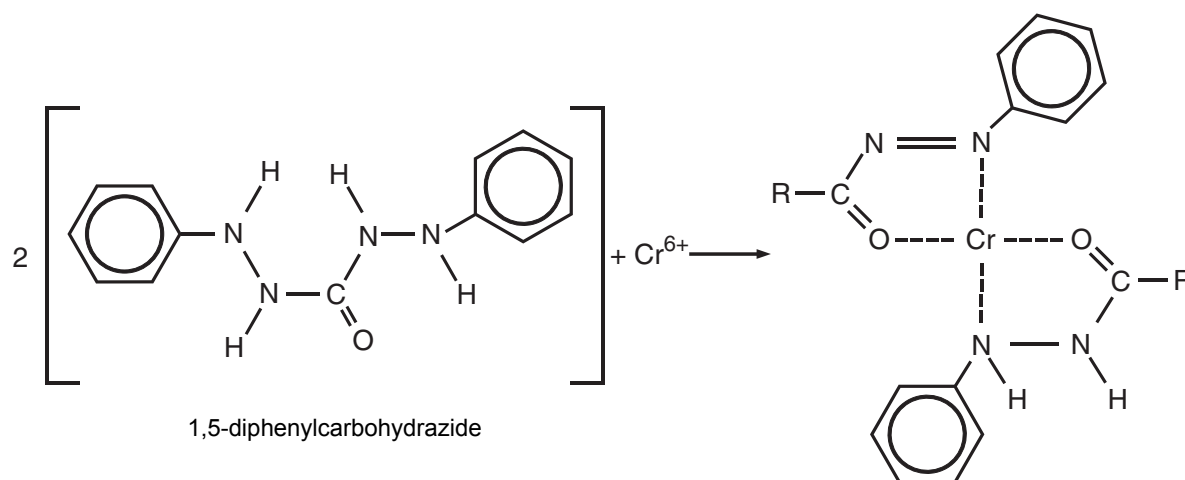


Figure 1 Hexavalent chromium chemical reaction

Total chromium

In the analysis for total chromium, the sample is heated to the boiling point under strong alkaline conditions in the presence of hypobromite. The trivalent chromium is converted to hexavalent chromium. The proper chemical conditions for this oxidation are provided by Chromium 1 Reagent Powder.

After the oxidation is complete, excess hypobromite is destroyed by the addition of Chromium 2 Reagent Powder. Then ChromaVer 3 Chromium Reagent, which contains an acidic buffer combined with 1,5-Diphenylcarbohydrazide, is added. A purple color develops with an intensity directly proportional to the total chromium concentration. The trivalent chromium can be determined by subtracting the hexavalent chromium test results from the results obtained in the total chromium test.

