

Method of analysis for determination of the chromium (Cr) species in water samples by spectrophotometry with diphenylcarbazide

**Adam Wiryawan^{1*}, Retno Suntari², Zaenal Kusuma², Rurini Retnowati¹,
R.Y.Perry Burhan³, Syekhfani²**

¹Department of Chemistry, Faculty of Sciences, Brawijaya University, Malang, East Java 65145, Indonesia

²Department of Soil Sciences, Faculty of Agriculture, Brawijaya University, Malang, East Java 65145, Indonesia

³Department of Chemistry, Faculty of Sciences, Institut Teknologi Sepuluh November (ITS), Surabaya, East Java 60122, Indonesia

Abstract : Speciation of Chromium (Cr) is very important because of the toxicity of these metals depending on the oxidation number and its concentration is very low in the water system. Chromium occurs in the environment primarily in two valence states, trivalent Cr(III) and hexavalent Cr(VI). Chromium(III) is an essential micro-nutrient for the human body, while the Cr(VI) is highly toxic and carcinogenic. Chromium(VI) in the water can be analyzed by spectrophotometry with diphenylcarbazide as reagent on pH=1 at maximum wavelength of 540 nm. The experimental result show that Cr(VI) can be analyzed using diphenylcarbazide in the concentration of 0.0015% and H₃PO₄ solution as acidic in 0.03 mol/L. The absorbance was measured at minutes 5 after preparation. There is interference from ion Fe(III) at least 6.0 ppm and this interference can be overcome by using 0.3% NaF solution. The limit of detection of this method is 0.1959 ppm. Chromium(VI) in the artificial samples, mix of Cr(III) and Cr(VI), can be analyzed by using this method without oxidation by KMnO₄ solution. While Cr(III) in the artificial samples, mix of Cr(III) and Cr(VI), can be analyzed by using this method via oxidation by KMnO₄ solution in the acidic media (H₂SO₄), the result of this analysis is the total concentration of Chromium. The concentration of Cr(III) can be calculate via subtract the total of Cr concentration by concentration of Cr(VI).

Keywords : speciation, Cr(III), Cr(VI), spectrophotometry, diphenylcarbazide, Fe(III), interference