

Spectrophotometric determination of fluoride in drinking water using aluminium complexes of triphenylmethane dyes

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Abstract

A sensitive spectrophotometric determination of fluoride in drinking water has been developed using aluminium complexes of triphenylmethane dyes (chrome azurol B and malachite green) as spectrophotometric reagents. The method allowed a reliable determination of fluoride in the range of 0.5–4.0 mg·ℓ⁻¹ for chrome azurol B and 0.0–2.0 mg·ℓ⁻¹ for malachite green. The molar absorptivity for the complexes of chrome azurol B at 582 nm and malachite green at 622 nm is 1.44×10^4 and 2.56×10^4 ℓ·mol⁻¹·cm⁻¹, respectively. The sensitivity, detection limit, quantitation limit, and percentage recovery for 1.5 mg·ℓ⁻¹ fluoride for the method using chrome azurol B were found to be 0.125 ± 0.003 μg·mℓ⁻¹, 0.2 mg·ℓ⁻¹, 0.5 mg·ℓ⁻¹, and 97.1 ± 4.2, respectively, and for malachite green were 0.143 ± 0.002 μg·mℓ⁻¹, 0.1 mg·ℓ⁻¹, 0.3 mg·ℓ⁻¹, and 97.9 ± 4.1, respectively.

Keywords: Fluoride analysis, spectrophotometric method, drinking water, aluminium triphenylmethane dye complexes, chrome azurol B, malachite green