

Free Chlorine Determination in Disinfectant Product using Visible Spectrophotometry based on Prussian Blue Degradation

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Abstract	<p>Disinfectant products with excessive chlorine could be dangerous for health and need quality control. It is important to develop an analytical method for monitoring product quality. The main objective of this work is to develop an alternative method and evaluate the analytical performance of visible spectrophotometry for determining free chlorine in disinfectant products based on the Prussian blue decomposition process. The capability of chlorine to oxidize ferrous to ferric ions makes the Prussian blue generated by ferrosulfate and potassium ferricyanide is decomposed and measured by spectrophotometer. The formation of Prussian blue was improved by optimizing some reaction conditions and assessing incubation time. Linearity, analytical concentration range, precision, accuracy, detection limit, and quantitation limit parameters were among the examined analytical parameters. The results showed that the optimum concentration of ferrosulfate, potassium ferricyanide, and hydrochloric acid for Prussian blue formation was 2.0 mmol L⁻¹, 3.0 mmol L⁻¹, and 0.5 mol L⁻¹, respectively, with 15 minutes incubation time after chlorine addition. Analytical performance parameters seemed appropriate for routine analysis purposes. The developed method can also be applied as an alternative analytical method to determine the free chlorine concentration of disinfection products in the market.</p>
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