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Development of a Discrete Flow System Using a Microsyringe as a Cell for the Photometric Determination of Iron

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A simple discrete flow system for the photometric determination of iron using a glass syringe as a mixer of a solution and as a sample cell has been developed. The system was assembled from a coupler combining a light source (a light-emitting diode, LED), a glass syringe, a photodiode detector (PD) and two plastic core fiber optics. The reagent and sample solutions were sucked into a syringe, and were then mixed by a reciprocating motion of a plunger, or simply turning the syringe upside down several times, manually. After mixing, the absorbance of the solution was measured *in situ*. The analytical figures of this system and the mixing method were tested with a methyl orange solution and evaluated through iron(III) determination by a 1,10-phenanthroline method. The proposed system was applied to the determination of iron(III) using 1,10-phenanthroline and thiocyanate as chelating reagents and an off-line concentration method using an activated-carbon column. By this simple system, iron(III) in a river-water certified reference material (CRM), JSAC 0302-3, and river-water samples were successfully determined with a detection limit (3σ) of 20 μg L^{-1}.

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