

DEVELOPMENT OF AN ON-SITE METHOD FOR THE DETERMINATION OF TOTAL IRON IN ENVIRONMENTAL AQUEOUS SAMPLES

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Various detection methods have been developed to determine the metal ion levels in the environment. Determination of metal ion concentrations in aqueous samples such as waste water using classical methods are time consuming and require a higher level of analytical knowledge. In some classical methods, results may have some uncertainty as the result under the laboratory conditions differ from the original environment conditions. Simple, on-site and faster methods are more effective for the determination of metal ion levels in the environment. This research is focused on development of an on-site colorimetric method to estimate the total Fe in environment aqueous samples. In this method, aqueous sample is treated with a reagent solution containing a reducing agent, a buffer, a complexing agent that can produce a coloured complex and agents to remove interferences. Reducing agent, hydroxyl amine converts all Fe(III) to Fe(II) ions when the sample treated with the reagent mixture. Phenanthroline, colouring agent in the reagent mixture forms a coloured complex with Fe(II) ions. A coagulant in the reagent mixture is used to remove any interfering mud particles in the sample. All these parameters were optimized to maximize the sensitivity. Samples treated with this optimized reagent solution were tested with an in-house build inexpensive light emitting diode (LED) based portable spectrophotometer to estimate the total Fe concentration. This in-house build portable spectrophotometer was program to develop the calibration graph and to store calibration data, and to produce the Fe(II) concentration of the sample automatically. This proposed method can detect up to 1 ppm of total iron in water samples. Samples prepared under laboratory conditions were tested using this method. Same samples were tested using atomic absorbance spectrophotometric (AAS) method. Student's t-test was used to validate paper-based results against AAS results.

Keywords: Determination of Fe(II), Portable spectrophotometer