

**DEVELOPMENT OF A COLORIMETER FOR  
THE FIELD ESTIMATION OF FLUORIDE IN  
DRINKING WATER**

A dissertation submitted to the  
Faculty of Science & Technology  
Uva Wellassa University

in partial fulfilment of the requirements for the award of the  
Degree of Bachelor of Technology

by

**WELIHENA GAMAGE NILRUKSHIKA DILESH  
KUMARI**

**Science and Technology Degree Program  
Uva Wellassa University, Sri Lanka**

**2012**

## Abstract

The name "colorimeter" is given to any instrument used for the determination or specification of colors. One type of colorimeter is an instrument used to find the concentration of a substance in solution, based on the intensity of color of the solution. If the solution to be tested is colorless, a reagent is added that reacts with the substance, producing a color. This type of colorimeter has a wide range of applications, including laboratory research, environmental analysis of water quality, analysis of soil components, monitoring of hemoglobin content in the blood and analysis of chemicals used in various industrial settings.

Presence of excess fluoride in drinking water causes various diseases that are collectively referred to as fluorosis. Fluorosis is endemic at least in 25 countries. The total number of people affected due to fluoride estimated is tens of millions. The major source of fluoride is lithogenic. Fluoride enters to the human body mainly through water. A minimum amount of fluoride is required in drinking water to prevent tooth decay. According to the WHO guidelines, the permissible limit of fluoride in drinking water is 1.5 mg/L. However, a regular intake of water containing excess F<sup>-</sup> causes many chronic diseases.

In this project a novel colorimeter is designed to determine fluoride concentration in water. The unit has alarming signals to alert people when the levels far exceed WHO recommendations. The colorimeter works according to Beer-Lambert Law of absorption. It is used in conjunction with the SPADNS method, which shows a color change in the visible region on addition of water containing fluoride to a reagent solution. That color region was identified by web cam and read the color intensity.