Example of materials report

Education, Discipline

Introduction:

The ionic fluoride is like free fluoride ions, but in chemical terms they are really not free, but ionized. The fluoride in the water is just fluoride [in the ionic form]. The fluoride in the water does not know if it came from sodium fluoride or calcium fluoride or another fluoride compound (in the inorganic form, of course). Fluoridation does not affect the appearance, taste, or smell of drinking water. It is normally accomplished by adding one of three compounds to the water: sodium fluoride, fluorosilicic acid, or sodium fluorosilicate. Incidentally, tests that are taken to measure the concentration of fluoride in the water only measure the inorganic form of fluoride.

A fluoride electrode is a type of ion selective electrode sensitive to the concentration of the fluoride ion. The fluoride ion electrode contains an internal reference electrode, an internal fluoride standard, and the LaF3 ion exchange crystal. An external reference electrode must be used to perform the measurement.

Apparatus: Orion 420A (or other model) Electrometer (pH/Voltmeter)

Fluoride Electrode – Orion 96-09 or other

Saturated calomel reference electrode

Magnetic Mixer – Teflon Coated Stirring Bar

50 ml beaker (quantity depends on number of samples)

Reagents: Stock Solution of Sodium Fluoride [7681-49-4] – 100ppm (1. 0 mL = 0. 1mg F)

Buffer Solution –Total Ionic Strength Adjuster Buffer (TISAB) - pH 5. 0 – 5. 5, containing CDTA

Calibration solutions: Three fluoride standards (50. 00 mL total volume) are to be prepared: 0. 1, 1. 0, 2. 5, 5. 0 and 10. 0 ppm.

Standards are prepared from the stock solution.

Sample solutions (water + mouthwash).

The mouthwash was from ACT – Anticavity Kids Rines (NaF 0. 05%) (0. 02% w/v Floride ion).

Procedure:

- 1000 ml of 100 ppm Fluoride solution was prepared, calculated as followed:

100pm/1000ml * 1000ml/1mg * 1000mg/1g * 41. 988g/mol =

- Five standard solutions were prepared as well. As shown :

- 10ppm*V = 0. 1ppm*50ml , V= 0. 5ml.

- 10ppm*V = 1. 0ppm*50ml, V= 5ml.

- 10ppm*V = 2. 5ppm*50ml, V= 12ml.

- 10ppm*V = 5ppm*50ml, V= 25ml.

- 100ppm*V = 10ppm*50ml, V= 5ml.

We made as well one Blank, with 25ml of water and 25ml of TISAB.

- Three water samples were prepared by other lab mates, and three mouthwash samples were prepared by us. (The samples to be analyzed consist of tap water taken from various locations and some types of mouthwashes or rinses. Water samples must be diluted 1: 1 with TISAB (25 mL sample/25 mL TISAB). Mouthwashes and rinses are analyzed by diluting 2. 00 mL of the sample with 25 mL of TISAB and diluting to 50 mL with

deionized water).

- All the solutions were tested by the PH/Volumeter, the fluoride sensitive electrode.

Data and Results:

The standers Readings :

- 10 ppm gave us – 40. 0 mV.
- 5 ppm gave us -28. 4 mV.
- 2. 5 ppm gave us -18. 1 mV.
- 1 ppm gave us -4. 9 mV.
- 0. 1 ppm gave us 20. 8 mV.
- Blank gave us 34. 4 mV.

The Rinse Readings:

- -38. 4 mV.
- -37. 3 mV.
- -38. 9 mV.

Rinse Average = -38. 2 mV.

Discussion:

The potentiometric determination of fluorideions in solution using electrodes that are sensitive for fluoride is a simple, cheap and reliable method of determination of fluoride ions in solutions. This method can detect very low concentrations of fluorideions up to 10-6 mol/ dm3using fluoride selective electrodes. This procedure requires the regulation of the ionic strength of the solutions, control of the amount of hydroxide ions and regulation of any interfering ions. Fluoride ion selective electrodes are very sensitive and have

a temperature range of between zero degrees centigrade and eighty degrees centigradeTISAB solution is used in regulating the effect of PH and compexing ions (Hall et al , 2010).

In this practical TISAB, solution was used in controllingthe influence of PH and completing metals in the solution. Direct pontiometric method was used to establish the amount of fluoride ions in the solution. In the experiment the fives standards were prepared against a background matrix of the buffer of ionic strength (Total Ionic Adjustment Buffer). The water samples with the unknown concentration of fluoride ions were prepared using TISAB in the expectation that the matrix will be analogous to the standards.

Reference

Hall, L, et al, (2010). “ Direct Potentiometric Determination of Total Ionic Fluoride in Biological Fluids”

Dissertation. University Of Rochester.