

Turbid metric determination of chloride

AIM- The aim of the experiment is to do the turbid metric determination of chloride.

BACKGROUND-

Chloride is an aesthetic contaminant as it imparts a salty taste to water. The concentration of chloride in water is variable and dependent on the chemical composition of water. Normally, ground water has a lower concentration of chloride than surface water. With regard to wastewater, the C concentration can be quite elevated due to industrial processes and the high levels of sodium chloride in the diet, which pass unchanged through the digestive system.

Automated systems have already been developed for chloride determination using flow injection analysis (FIA), a methodology which presents significant advantages in comparison to conventional methods, in terms of sampling rate and reagent consumption. Some of these systems involve the reaction between chloride and mercury thiocyanate, with subsequent colorimetric measurement of iron thiocyanate, and therefore require the use of this toxic reagent (mercury thiocyanate), as well as iron nitrate. A less environmentally harmful system has been proposed, based on a turbid metric estimation involving silver nitrate with the formation of silver chloride.

REQUIREMENTS-

1. P^H Meter
2. Burette
3. All reagents must be ACS reagent-grade:

Barium chloride, anhydrous, Hydrochloric acid, 37%

Nitric acid, 70%

4. Potassium chromate indicator
5. Silver nitrate
6. Sodium chloride
7. Sodium hydroxide, 1 N

PROCEDURE-

Barium Chloride, 10%

In a 500 ml beaker, 50 g of barium chloride was transferred. Then it was added with the deionized water to the barium chloride until reaching a total of 500 ml of solution. After that it was added with a stirring magnet to the beaker and stirred on a magnetic stirrer. Once all the barium chloride has been dissolved, transferred the solution to an airtight container.

Dilute Nitric Acid

Two mL of nitric acid was measured in a 10 ml graduated cylinder, and measured 38 mL of deionized water in a 50 ml graduated cylinder. Then the

deionized water and nitric acid were combined in a 200-mL tall-form beaker. Then it was stirred on a magnetic stirrer. Once the solution is thoroughly mixed, it was transferred into a drop-dispensing bottle.

Potassium Chromate Indicator

Accurately weighed 50 g of potassium chromate powder was taken in a 250-mL beaker. Hundred mL of deionized water was taken in a 100-mL graduated cylinder. Then it was added with the deionized water to the beaker with the potassium chromate. Then it was stirred on a magnetic stirrer for a while. Once all of the potassium chromate has been dissolved, the solution was transferred into a drop dispensing bottle.

Silver Nitrate, 0.1 N

On a balance, accurately weighed 17 g of silver nitrate powder was measured. In a graduated cylinder, 1 L of deionized water was measured. Then the silver nitrate and deionized water were mixed in a 1 L beaker. And then the solution was stirred on a magnetic stirrer. Once all of the silver nitrate has been dissolved, the solution was transferred into a 1 L light protective storage bottle.

Approximately 5 g of sodium chloride was dried at 212°F (100°C) for at least 1 hr. Using an analytical balance, weighed quantity of 0.2 g of sodium chloride to the nearest 0.0005 g into a tared 200-mL tall-form beaker. In a graduated cylinder, 100 mL of deionized water was measured. Then deionized water was added with to the beaker with the sodium chloride. Again the solution was stirred on a magnetic stirrer. Once the solution is thoroughly mixed, 10 drops of potassium chromate indicator added to the solution. Then a 50 ml burette was filled with the silver nitrate solution and titrated the sodium chloride solution with the silver nitrate to the first color change.

$$N = \frac{W}{(0.05844) V}$$

Where:

N = normality of the silver nitrate solution

W = mass of sodium chloride used for the titration, g

V = volume of silver nitrate used for the titration, mL.

The result from the titration was used to calculate the normality to at least to 3 significant digits:

Chloride ion content

50 ml of the filtered sample was pipetted out into a 200-mL tall-form beaker. Using the pH meter or pH paper, added either dilute nitric acid or dilute sodium hydroxide to adjust the sample pH to between 8–9. Then 11 drops of potassium chromate indicator was added to the sample. Then Stirred the solution until a solid yellow color persists throughout the sample. Then a 50-mL burette was filled with the 0.1 N silver nitrate solutions. It was stirred with a magnetic stirrer. Added the silver nitrate drop by drop until a brick red color persists

throughout the sample. Recorded the amount of silver nitrate used. Then the chloride ion concentration was estimated.

Calculations-

$$\text{ppm Chloride} = \frac{3.5433 \text{ NVA (10,000)}}{S}$$

Where:

N = normality of silver nitrate (AgNO_3)

V = volume of AgNO_3 , mL

A = aliquot factor

S = sample weight, g.

CONCLUSION-

The amount of sulfate in the sample was found to be..... mg.

REFERENCES-

1. Mesquita RB. Fernandes SM (https://www.ncbi.nlm.nih.gov/pubmed/?term=Fernandes%20SM%5BAuthor%5D&cauthor=true&cauthor_uid=12094945), Rangel AO (https://www.ncbi.nlm.nih.gov/pubmed/?term=Rangel%20AO%5BAuthor%5D&cauthor=true&cauthor_uid=12094945). Turbidimetric determination of chloride in different types of water using a single sequential injection analysis system, J Environ Monit. (<https://www.ncbi.nlm.nih.gov/pubmed/12094945>) 2002;4(3):458-61.