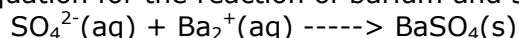


Determination of Sulfate by Turbidimetric Method

A group of environmental scientists are travelling to a mining town to research the affects of mining on human water supplies and the efficiency of several water treatment techniques. Your group has been assigned the task of determining the concentration of sulfate in the local waters using a turbidimetric method. When testing the water keep in mind that an acceptable concentration for drinking water is 250ppm of sulfate. Although sulfate is not particularly toxic if the concentration is too high it may cause other problems, such as build up in high-pressure boilers, the taste of the water being bitter, and at concentrations above 1000ppm, the water may cause diarrhea. The turbidimetric method you will use to determine sulfate concentration is based on the fact that light is scattered by particulate matter in aqueous solution. When barium and sulfate react in water, they make the solution turbid, which means the concentration of the Sulfate can be measured by using a spectrophotometer. The equation for the reaction of barium and sulfate is shown below



Determine the concentration of sulfate by using the following method:

First create a conditioning reagent by mixing 50ml glycerol with a solution containing 30ml concentrated HCl, 300ml distilled water, 100ml isopropyl alcohol, and 75g NaCl. Then, using a stock solution of 1000ppm sulfate, create four 100ml standards with the concentrations of 10.0ppm, 20.0ppm, 40.0ppm, and 80.0ppm. For each of the standards use the following procedure:

Add 10ml of standard and 10ml of distilled water to a 250ml Erlenmeyer flask. Then add 5.0ml of the conditioning reagent and stir gently. Measure about 0.1-0.2g of 20-30mesh BaCl₂ and add to the flask. Stir the contents of the flask for one minute. After the completion of the stir time, quickly and carefully pour the contents into a spectrophotometer cell, and let stand for five minutes. While waiting, zero the spectrophotometer at 420nm with distilled water and then take the absorbance of the standard. After taking the absorbance for the remaining three standards create an absorbance vs. concentration curve, using the original concentrations of your standards. To find the concentration of sulfate in your samples, use the same procedure as used for your standards

Pre Lab Questions:

1. How is a spectrophotometer calibrated?
2. Once the absorbance vs. concentration graph is completed how will can the concentration of the water sample be found?

Post Lab Questions:

1. Show the absorbance vs. concentration graph.
2. What is the equation for the best-fit line?
3. What is the concentration of chloride in the water sample?