Introduction

The purpose of this exercise is to perform quantitive analysis on KMnO4 in order to find a standard curve and determine the concentration of unknowns. A spectrophotometer is used in the quantitative analysis of substances. Through the use of this modern machine that measures the light absorbed in a particular part of the spectrum, one can determine the concentration of a substance. The process relies on Beer's Law of specific absorbency the law states that absorbency is equal to the molar absorbance constant times the path length of light, times the concentration. Through the use of this formula we can find the concentration of a substance in a solution.

Procedure

The spectrometer was set to a wave length of 526 nm. The spectrometer was set to its starting point by measuring a sample of pure distilled water and using that value as zero.

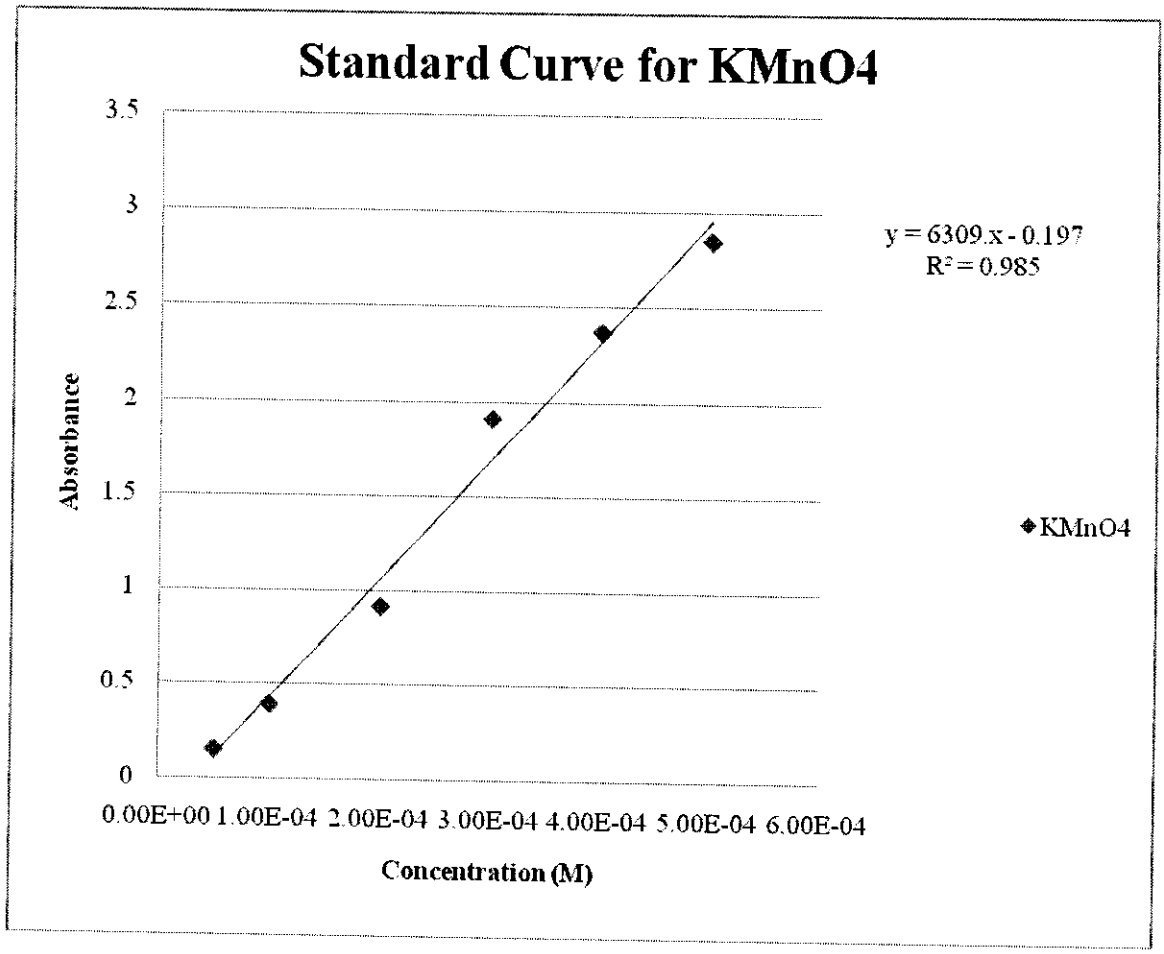
In the experiment 6 100 ml beakers were obtained. The beakers received different quantities of 0.0050 M KMnO4. 1 ml was added to the first beaker, 2 ml in the second beaker, 4 ml in the third, 6 ml in the fourth, 8 ml the fifth, and 10 ml to the sixth. Then the beakers were filled the rest of the way up to their 100 ml mark with de-ionized water. The solutions were shaken. Then a small sample was taken from each beaker and placed in a spectrophotometer to measure the absorbency of each solution. Two samples of unknown concentrations were also measured by the spectrophotometer.

Results

Because all other components of Beer's Law were known, only the spectrophotometer's analysis of absorbance was needed to find a standard curve for KMnO4. Below are the data:

concentration	absorbance	ml stock
5.00E-05	0.149	1
1.00E-04	0.39	2
2.00E-04	0.915	4
3.00E-04	1.917	6
4.00E-04	2.373	8
5.00E-04	2.854	10

This data was entered into a spreadsheet and regression analysis was done in order to find the best fit curve and R squared value.



Discussion

Because the R squared value was found to be very close to 1 (0.985), a straight line can be used to describe the curve. Y=6309x – 0.197 describes the curve.

That information was then used to find the concentration of the unknown substances, which were measured by the spectrophotometer to have absorbencies of 0.609 and 1.080 respectively. When plugged into the curve formula, it was found that:

Uknown 1:

0.609=6309x – 0.197

x(concentration)= 1.277E-04

Uknown 2:

1.080=6309x – 0.197

x(concentration)= 2.024E-04