Lab-report

Date: 98-11-09

Determining solution concentration using a spectrophotometer:

Chemicals and apparatus:

- Spectrophotometer with equipment
- 4 flasks, 100 ml each
- Cu^{2+} (actually $Cu(NH_3)_4^{2+}$ but the object of research is only the Cu^{2+})
- Distilled water

Lab:

One way, and a quite simple way to determine the concentration of a solution is to use a spectrophotometer, an apparatus that emits a light beam at one end of a flask and then measure how much that passes through. The apparatus can be configured to measure just one frequency, and since every substance has its own figure of frequencies, you can very simple detect substance and concentration. In this case I am to measure the concentration of Cu^{2+} in a solution and I know that Cu^{2+} has a maximum absorbance at 610 nm, so that will be the wavelength I will use.

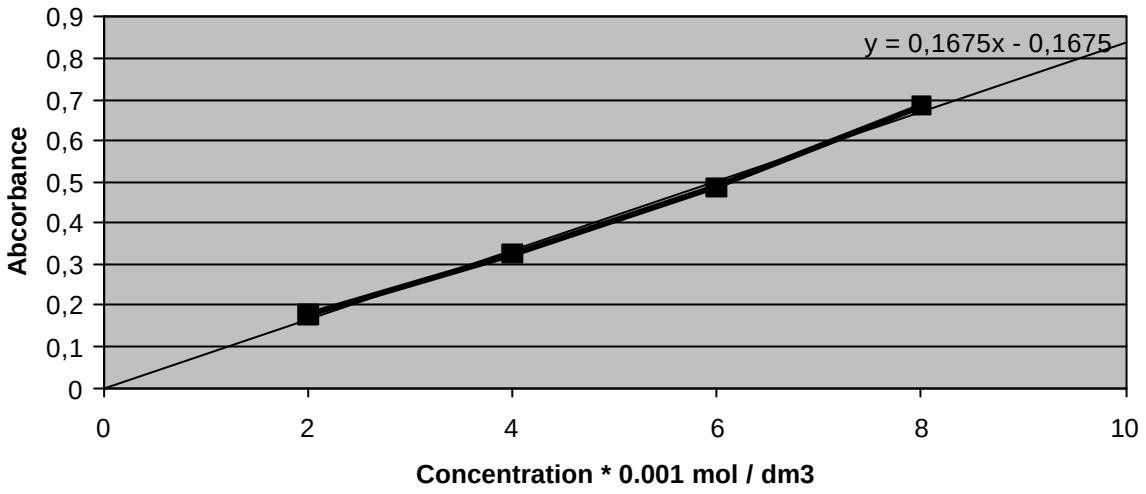
First I took four flasks and I filled one with 4.00 ml of 0.0500 M $Cu(NH_3)_4^{2+}$, and the other one with 8.00 ml, the third with 12.00 ml and the last one with 16.00. I then added 10 ml of 5.0 M NH_3 and then added distilled water to the 100 ml limit. Now I had four samples of the same solution but with different concentration. I stirred well and then placed them in the spectrophotometer, and here are the results I got:

ml of $Cu(NH_3)_4^{2+}$	Conc of Cu^{2+}	Absorbance at 610nm
4.00	0.002	0.179
8.00	0.004	0.326
12.00	0.006	0.486
16.00	0.008	0.634

The concentration is calculated by the formula: $c_1 * v_1 = c_2 * v_2$.

You can see a graph on next page.

The final test was to get an unknown sample form our teacher, use the spectrophotometer and the graph to determine the concentration of the sample. The absorbance of sample I got was 0.305. So I checked it with the graph and my conclusion was that the concentration was $1.988 * 10^{-3}$ mol / dm^3.


y = 0,1675x - 0,1675
Abcorbance
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
0
2
4
6
8
10
Concentration * 0.001 mol / dm3