**Unit 1-2 Chemistry SAC task**: Analysis and evaluation of generated primary data

**Title**: Colorimeter and concentration

**Background**

A colorimeter (UV-visible spectrophotometer) can be used to determine the concentration of a coloured solution. An essential part of this process is the construction of a calibration curve from standard solutions.

This task also provides students with experience in diluting solutions accurately.

You will be supplied with a 0.500 M CuSO4 solution. You will prepare several dilutions of this solution, test their absorbance in a colorimeter and use the data to prepare a calibration curve. You will then use the calibration curve to determine the concentration of an unlabelled CuSO4 solution.

**Method**

You need to dilute the 0.50 M CuSO4 solution to prepare 100 mL solutions of the other concentrations shown in the table. Complete the table to determine the volume of 0.500 M solution you require and the volume of water you require for each solution.

|  |  |  |  |
| --- | --- | --- | --- |
| Concentration CuSO4 | Volume 0.50 M CuSO4 | Volume water | Absorbance |
| 0.5 | 100 | 0 |  |
| 0.4 |  |  |  |
| 0.3 |  |  |  |
| 0.2 |  |  |  |
| 0.1 |  |  |  |

Test one of your solutions in a colorimeter or spectrophotometer to determine the appropriate wavelength to maximise absorption (red light).

Record the absorbance of each solution.

Construct a calibration curve.

Your teacher will supply you with a solution of unknown concentration. Use your calibration curve to determine its concentration.

**Commentary for teachers**

The emphasis in this task is on collecting, graphing and analysing data so the student report should focus on these aspects.

Student report to include

* Table above completed
* Calibration curve with appropriate scales and line of best fit
* Commentary on the linearity and accuracy of the calibration curve.
* Concentration of unknown solution determined.

This task offers the opportunity for the results of each group to be collated for further commentary on the accuracy of this technique.