Determination of the Concentration of Solutions of the Blue food dye using Spectrometer

Students Name

Name of the Course

Number of Lab

Instructors Name

Date of Experiment

**Objectives**

To utilise the spectrometer to establish the concentration of solutions of the blue food dye.

**Introduction**

The spectrometer provides a measurement of the intensity of the light beam before and after it goes through the sample and provides the comparison of the two concentrations. The spectrometers have broad applications in the environmental science for establishing the pollutants and the interested compounds. For instance, the device can measure compounds found in the water like chlorine, iron, lead and other compounds of interest for the quality of drinking water.

**Materials**

• Spectrometer

• Distilled water

• Graduated Cylinders

• Plastic transfer dropper

• Set of glass cuvette

**The procedure of using Spectrometer**

1. The power was switched on to the spectrometer and allow it to warm up for 15 minutes

2. The wavelength was set at 615 when using the green food colouring

3. With the spectrometer in the made of Transmittance, the instrument I zero by usage of the bottom left the knob

4. Cavette was placed with water in the spectrometer, and it is set at 100% with the right bottom knob

5. The instrument was then ready for utilisation

6. The cuvette was placed with the solution in the spectrometer then the lid was closed, and absorbance is recorded.

**Method of the experiment**

1. The original solution was measured absorbance using the spectrometer at 320ppm

2. 5ml of the solution was taken from step 1 and 5ml of water was added, and the measurement of the absorbance was taken at 160ppm

3. 5ml of the solution was taken from step 2 and 5ml of water was added, and the measurement of the absorbance was taken at 80ppm

4. 5ml of the solution was taken from step 3 and 5ml of water was added, and the measurement of the absorbance was taken at 40ppm

5. 5ml of the solution was taken from step 4 and 5ml of water was added, and the measurement of the absorbance was taken at 20ppm

6. The unknown sample was measured the absorbance with the spectrometer

7. Step 6 was repeated with other unknown samples

8. The calibration curve was drawn with data from the steps 1-5

9. The calibration curve was used to establish the concentration of every unknown sample in step 7 and 6.Results

**Table 1. Calibration Data**

|  |  |
| --- | --- |
| Concentration ppm | Absorbance |
| 320ppm | 0.476 |
| 160ppm | 0.240 |
| 80ppm | 0.107 |
| 40ppm | 0.055 |
| 20ppm | 0.042 |

**Table 2.Unkown Data**

|  |  |  |
| --- | --- | --- |
| Sample | Absorbance | Concentration ppm |
| Unknown A | 0.261 | 175 |
| Unknown B | 0.71 | 50 |
| Unknown C | 0.131 | 75 |

**Discussion**

The spectrometer was used to establish the concentration of solutions of the blue food dye. From the graph below, the absorbance is directly proportional to the concentration.

Sample Absorbance Calibration Graph

The graph was used to find the concentration of the unknown samples. The outcomes are presented in the table below. The values of the concentrations from the chart and the values generated from the experiment are different. The variance between the data is because of parallax error when reading measurements. In the graph for the unknown A the concentration in ppm was 178 while from the data collected from the experiment the concentration was 175ppm. There is a deviation of 3 ppm.

|  |  |  |
| --- | --- | --- |
| Sample | Absorbance | Concentration ppm |
| Unknown A | 0.261 | 178 |
| Unknown B | 0.71 | 118 |
| Unknown C | 0.131 | 89 |

**Conclusion**

In conclusion the aim of the paper was to utilize the spectrometer to establish the concentration of solutions of the blue food dye. The graph was used to find the concentration of the unknown samples. The outcomes are presented in the table below. The values of the concentrations from the chart and the values generated from the experiment are different. The variance between the data is because of parallax error when reading measurements.