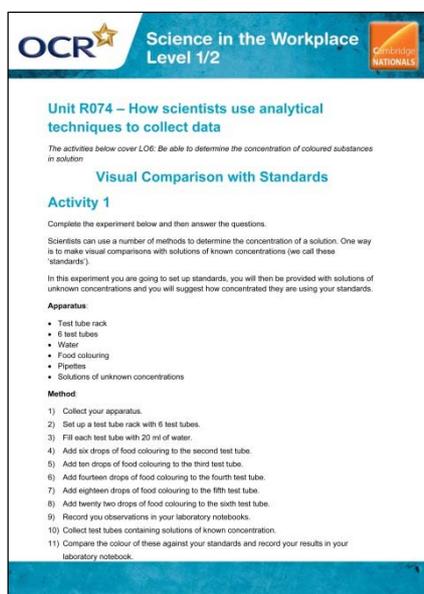


Unit R074 – How scientists use analytical techniques to collect data

Visual Comparison with Standards

Instructions and answers for teachers

The activity below covers L06: Be able to determine the concentration of coloured substances in solution



OCR  Science in the Workplace
Level 1/2 

Unit R074 – How scientists use analytical techniques to collect data

The activities below cover L06: Be able to determine the concentration of coloured substances in solution

Visual Comparison with Standards

Activity 1

Complete the experiment below and then answer the questions.

Scientists can use a number of methods to determine the concentration of a solution. One way is to make visual comparisons with solutions of known concentrations (we call these 'standards').

In this experiment you are going to set up standards, you will then be provided with solutions of unknown concentrations and you will suggest how concentrated they are using your standards.

Apparatus:

- Test tube rack
- 6 test tubes
- Water
- Food colouring
- Pipettes
- Solutions of unknown concentrations

Method:

- 1) Collect your apparatus.
- 2) Set up a test tube rack with 6 test tubes.
- 3) Fill each test tube with 20 ml of water.
- 4) Add six drops of food colouring to the second test tube.
- 5) Add ten drops of food colouring to the third test tube.
- 6) Add fourteen drops of food colouring to the fourth test tube.
- 7) Add eighteen drops of food colouring to the fifth test tube.
- 8) Add twenty two drops of food colouring to the sixth test tube.
- 9) Record your observations in your laboratory notebooks.
- 10) Collect test tubes containing solutions of known concentration.
- 11) Compare the colour of these against your standards and record your results in your laboratory notebook.

Associated files:

Visual Comparison with Standards (activity)

Activity 1 – approx. 1 hour



This activity offers an opportunity for English skills development.

This lesson element allows learners to gain an understanding of how scientists make visual comparisons with solutions of known concentrations ('standards') and what the advantages/disadvantages of this method are.

This activity can lead into a group discussion about the use of colorimeters.

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Teacher Information

The known samples must be set up with the same volume of water. Some can be made with 6, 10, 14, 18 or 22 drops of food colouring, or they can be made using numbers of drops in between these values so learners are recognising that the known does not quite match their standards and therefore must be in between two of them. All observations should be recorded in their laboratory notebooks.

Safety: Carry out a risk assessment for this experiment in the space provided. You might like to present your information in a table.

Examples of risks include:

- Running in the laboratory
- Having long hair not tied up
- Using glass test tubes
- Having test tubes lying flat on the bench
- Spilling solutions
- Having coats and school bags on the floor in the laboratory

Learners should list the risk, the control measure, the level of risk associated with it, how to avoid the risk, what to do if the risk happens.

Questions:

(1) Is this a reliable method of determining concentration? Explain your answer below.

No- it is subjective and what one person thinks will differ from another person.

(2) What are the advantages and disadvantages of this method?

Advantages:

- Do not need any expensive equipment
- Do not need to be trained to use the equipment
- Easy method
- Gives you fairly quick results

Disadvantages:

- This is not a reliable method
- What one person thinks will be different from another person

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