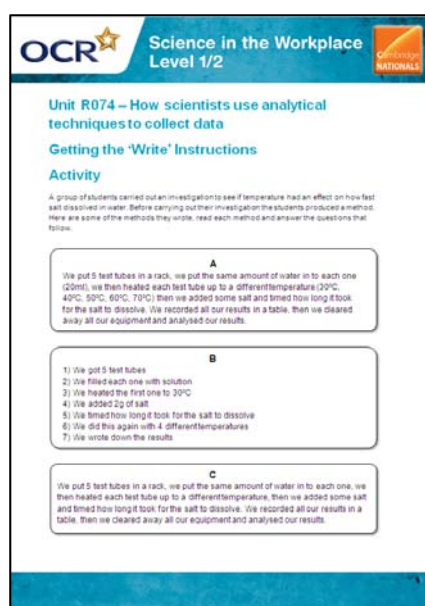


Unit R074 – How scientists use analytical techniques to collect data

Getting the ‘Write’ Instructions

Instructions and answers for teachers

The activities below cover LO3: Be able to examine and record features of samples



OCR Science in the Workplace Level 1/2 Cambridge NATIONALS

Unit R074 – How scientists use analytical techniques to collect data

Getting the ‘Write’ Instructions

Activity

A group of students carried out an investigation to see if temperature had an effect on how fast salt dissolved in water. Before carrying out their investigation the students produced a method. Here are some of the methods they wrote, read each method and answer the questions that follow.

A

We put 5 test tubes in a rack, we put the same amount of water in to each one (20ml), we then heated each test tube up to a different temperature (20°C, 40°C, 50°C, 60°C, 70°C) then we added some salt and timed how long it took for the salt to dissolve. We recorded all our results in a table, then we cleared away all our equipment and analysed our results.

B

- 1) We got 5 test tubes
- 2) We filled each one with solution
- 3) We heated the first one to 30°C
- 4) We added 2g of salt
- 5) We timed how long it took for the salt to dissolve
- 6) We did this again with 4 different temperatures
- 7) We wrote down the results.

C

We put 5 test tubes in a rack, we put the same amount of water in to each one, we then heated each test tube up to a different temperature, then we added some salt and timed how long it took for the salt to dissolve. We recorded all our results in a table, then we cleared away all our equipment and analysed our results.

Associated files:

Getting the ‘Write’
Instructions (activity)

Activity 1 – approx. 30 mins
– 1 hour



This activity offers an opportunity for English skills development.

This activity shows learners a number of methods written to varying levels of detail. Learners can complete the activities to identify which method is best and why.

A

We put 5 test tubes in a rack, we put the same amount of water in to each one (20ml), we then heated each test tube up to a different temperature (30°C, 40°C, 50°C, 60°C, 70°C) then we added some salt and timed how long it took for the salt to dissolve. We recorded all our results in a table, then we cleared away all our equipment and analysed our results.

B

- 1) We got 5 test tubes
- 2) We filled each one with solution
- 3) We heated the first one to 30°C
- 4) We added 2g of salt
- 5) We timed how long it took for the salt to dissolve
- 6) We did this again with 4 different temperatures
- 7) We wrote down the results

C

We put 5 test tubes in a rack, we put the same amount of water in to each one, we then heated each test tube up to a different temperature, then we added some salt and timed how long it took for the salt to dissolve. We recorded all our results in a table, then we cleared away all our equipment and analysed our results.

D

We heated up some water with salt in and timed how long it took for the salt to dissolve. We recorded what we found.

E

We got 5 test tubes and filled them with water. Then we added salt to each one. We heated each tube up to a different temperature and timed how long it took for the salt to dissolve.

F

We carried out a risk assessment. We collected our apparatus, we put 5 test tubes in a rack. We used a kettle to heat up some water to 70°C and carefully measured out 20ml using a measuring cylinder and poured it into the first test tube. Next we weighed out 2g of salt using a balance. We added this to the same test tube and started the stop clock. We waited to see how long it took for the salt to dissolve and then stopped the stop clock. Then we recorded our results in our table. We did the same thing again but this time made sure the water was at 60°C. We made sure we used the same amount of water and salt as before. We carried on until we had results for 50°C, 40°C and 30°C as well. Next we repeated the whole experiment two more times so we had three results for each temperature. We made sure we had a full set of results and then we cleared away all the apparatus. Then we worked out the mean for each temperature and analysed the results.

G

We put 5 test tubes in a rack, we put the same amount of water in to each one, we then heated each test tube up to a different temperature, then we added some salt and timed how long it took for the salt to dissolve. We repeated each test 3 times. We recorded all our results in a table, then we cleared away all our equipment and analysed our results.

H

We heated up some water and poured it into some test tubes. We added some salt to the water. We waited for the salt to dissolve and recorded our results in the table we had drawn, then we looked at our results and decided what they meant. Then we put all the equipment away.

Activity

A group of students carried out an investigation to see if temperature had an effect on how fast salt dissolved in water. Before carrying out their investigation the students produced a method. Here are some of the methods they wrote, read each method and answer the questions that follow.

- (1) If you were asked to repeat this experiment, which method do you think is the best one to follow? Explain your answer.

Method (F)

The idea that it: gives detailed step by step instructions, it included a risk assessment, it tells you how much water to use, how much salt to use, what temperatures to use, it indicates how the water was heated up and measured out. It tells you when to start and stop the stop clock. It tells you how many times to do each temperature, where to record the results and what to do with the three results.

- (2) Read method (G).
Give three good things about the method.

Any three from the following:

- It tells you how many test tubes to use.
- It tells you that they used the same amount of water.
- It indicates that they are using different temperatures.
- They repeated the test three times.
- It tells you to clear away the apparatus.

Give three improvements that could be made to the method.

Any three from the following:

- It should tell you how much water to use.
- It should tell you what temperatures to use.
- It should tell you how much salt to add.
- It should tell you what to do with the three results.
- It should tell you how to heat up the water.
- It should tell you how to measure the water.
- It should tell you how to measure the salt.
- It could tell you to do a risk assessment.

- (3) If you were given method (D) to follow, what questions would you want answered before you could carry out the procedure to obtain reliable results?

How do we heat up the water?
How much water do we use and how do we measure it out?
How much salt do we use and how do we measure it out?
When do we add the salt?
What do we put the water and salt in?
How do we know what the temperature of the water is?
What do we use to time it and when do we start and stop timing?
Where do we record our results?
What should the temperature of the water be?
How many different temperatures of water do we test?
How many times do we do each test?

- (4) Why do you think that method (G) and (F) repeated the experiment three times?

The idea that they wanted to make their results more reliable, to see if they were repeatable, they could identify any anomalous results etc.

- (5) Why does method (F) carry out a risk assessment?

Any of the following:

Make sure that the students are safe (those carrying out the investigation and others in the room).

Students are using glass and hot water which could be dangerous.

To identify any potential risk and eliminate them.

To know what to do if something does go wrong.

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