



Assessment task	
Year level	7
Learning area	Science
Subject	Chemical Sciences
Title of task	Cleaning water investigation
Task details	
Description of task	Students complete an activity to filter solid impurities from water and answer questions about the process and further purification techniques.
Type of assesment	Investigation
Purpose of assesment	Used to support learning of a concept (formative assessment) and to contribute to the students mark for the purpose of grading.
Assessment strategy	Students demonstrate learning through working individually and in pairs/groups to separate solid impurities from water and complete questions on the activity.
Evidence to be collected	Completed task activity sheet
Suggested time	2 lessons
Content description	
Content from the Western Australian Curriculum	<p>Science understanding Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques</p> <p>Science inquiry skills Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed Measure and control variables, select equipment appropriate to the task and collect data with accuracy Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions based on evidence Use scientific knowledge and findings from investigations to evaluate claims based on evidence</p>
Task preparation	
Prior learning	Students will have been taught about separation methods of filtration, evaporation and distillation, and had experience with carrying out filtration.
Assessment differentiation	Teachers should differentiate their teaching and assessment to meet the specific learning needs of their students, based on their level of readiness to learn and their need to be challenged. Where appropriate, teachers may either scaffold or extend the scope of the assessment tasks.

Assessment task

Assessment conditions	Students work individually and in pairs to separate solid impurities from water and complete questions on the activity.
Resources	As stated in activity sheet

Instructions for teacher

Cleaning water investigation

Task is conducted in class with a combination of individual and group work.

It is important for our health that the water we use in our homes for drinking and other purposes is clean. Before water reaches our homes it needs to have many impurities removed, including solids and certain dissolved substances.

Aim of the investigation

In this investigation you will design a method to separate the solid components of a mixture from the water solution. You will do the planning on an individual basis and work with a partner to carry out the practical part of the activity.

There are two parts to the investigation. After your first attempt at filtering the mixture, you will redesign your filtration system to try to make it faster (without letting any solid pass through).

You will be provided with the following equipment for this activity:

- impure water that has coffee dissolved in it, coffee grinds and rice
- sand
- gravel (or glass beads)
- cotton wool
- a plastic drink bottle with the bottom cut off (or large plastic filter funnel)
- support device to hold the water bottle
- empty container suitable for holding liquid
- stop clock or timer.

Instructions to students

Planning

With your partner, discuss a way to separate the solid components of the dirty water mixture (that has dissolved coffee, coffee grounds and rice in it) from the solution. The equipment listed above should be used to help you design a way to separate the mixture.

1. After planning with your partner, write your description of how you will carry out the separation. Draw a diagram of how you will set up your equipment. Label your diagram. (5 marks)

Show this to your teacher before moving to the next part of the activity.

Carrying out the activity

Marks for carrying out the activity will be awarded on the following aspects:

- Safe working practices (2 marks)
- Work area and equipment cleaned after completion of activity (2 marks)

Part 1

Working with your partner, set up your equipment and pour about 200 mL of the dirty water mixture into the 'funnel'. Measure and record the time it takes for the water to run through the filter you have chosen.

Filtering time: _____

Throw your used filtering materials into the waste container provided and clean your bottle ('funnel').

Working on your own, answer the following question.

2. Describe your filtrate (the liquid coming out of the funnel) and comment on how well your filtering method removed the solids. (4 marks)

Part 2

With your partner, discuss one way that the speed of filtration could be increased (without allowing solid to pass through).

3. After discussing with your partner an improved filtration method, write your description of the improved separation method below. Draw a diagram of how you will set up your equipment. Label your diagram. (4 marks)

4. Explain why you think this will speed the filtration. (2 marks)

5. What volume of water mixture should you use in this part to test how fast it filters? Why? (2 marks)

Now set up the equipment to test the idea you have to speed up filtration.

Carry out the filtration to test if it is faster. Record the time it takes for the water to run through.

Filtering time: _____

Results and questions

Working on your own, complete the questions below.

6. For each part of the filtration system given below state what it did.

(a) the bottle (1 mark)

(b) cotton wool (1 mark)

(c) sand (1 mark)

(d) gravel (or glass beads) (1 mark)

7. How well were solids removed in your second attempt compared to your first attempt?
Explain any differences.

(3 marks)

8. Compare the time it took for the filtering in your two attempts. Explain why they had different times. (3 marks)

9. The water you get from filtering is still impure – it has coffee dissolved in it. Name one way you could make the water pure (that is, get the dissolved coffee out of the water). Explain how the method you have named works. (5 marks)

Sample marking key	
Planning	
Description	Marks
After planning with your partner, write your description of how you will carry out the separation. Draw a diagram of how you will set up your equipment. Label your diagram.	
Comprehensively describes their separation method	3
Briefly describes the their separation method	2
Provides a limited description of their separation method	1
Subtotal	3
Diagram is clear and labelled showing equipment appropriate to method described	2
Diagram provided but lacks detail and/or some labelling	1
Subtotal	2
Answers could include, but is not limited to:	
• Funnel of bottle is plugged by cotton wool	[1]
• Sand and gravel (or glass beads) are layer above cotton wool	[1]
• Funnel (bottle) is supported and container for catching water is used to catch filtrate	[1]
• Diagram shows funnel (bottle) supported with cotton wool, sand and gravel (glass beads)	[1]
• All parts are correctly labelled.	[1]
Description	Marks
Carrying out the activity	
Work is carried out safely	1-2
Work are and equipment cleaned appropriately	1-2
Subtotal	4
Answers could include, but is not limited to:	
Reason why this is useful:	
• reduces the number of items you need to go through to find what you want	[1]
• this saves time	[1]
• easier to find items.	[1]
Planning total	9
Part 1	
Description	Marks
Describe your filtrate (the liquid coming out of the funnel) and comment on how well your filtering method removed the solids.	
Comprehensively describes the filtrate	2
Briefly describes the filtrate	1
Subtotal	2

Comments on the effectiveness of filtering method referring to results to support their comment	2
Comments on the effectiveness of filtering method with minimal/no reference to results to support their comment	1
Subtotal	2
Part 1 total	4
Part 2	
Description	Marks
After discussing with your partner an improved filtration method, write your description of the improved separation method below. Draw a diagram of how you will set up your equipment. Label your diagram.	
Comprehensively describes their separation method including clear indication of difference from first trial	1
Briefly describes the their separation method	2
Subtotal	2
Diagram is clear and labelled showing equipment appropriate to method described	1
Diagram provided but lacks detail and/or some labelling	2
Subtotal	2
Description	Marks
Explain why you think this will speed the filtration.	
Comprehensively explains why they think the amended method will speed filtration	2
Briefly explains why they think the amended method will speed filtration	1
Subtotal	2
Answer could include, but is not limited to: Use less cotton wool, sand and/or gravel (glass beads) Less cotton wool, sand and/or gravel will mean there is less distance the mixture has to pass through so it should be faster.	[1] [1]
Description	Marks
What volume of water mixture should you use in this part to test how fast it filters? Why?	
Same volume as in Part 1	1
To ensure a fair test	1
Subtotal	2
Part 2 total	8

Results and questions	
Description	Marks
For each part of the filtration system given below state what it did.	
(a) the bottle Held the filtering agents (i.e. sand and gravel (or glass beads))	1
(b) cotton wool Prevented the sand and gravel from falling through the funnel	1
(c) sand Stopped the coffee grounds falling through (removed the coffee grounds from the mixture)	1
(d) gravel (or glass beads) Stopped the rice grains falling through (removed the rice grains from the mixture)	1
Subtotal	4
Description	Marks
How well were solids removed in your second attempt compared to your first attempt? Explain any differences.	
Describes difference between the filtrate from method 2 compared to method 1	1
Comprehensively explains any differences with references to changes made in the filtration method	[2]
OR	
Briefly explains any differences with minimal/no reference to changes made in the filtration method	[1]
Subtotal	3
Description	Marks
Compare the time it took for the filtering in your two attempts. Explain why they had different times.	
States difference in times for the two methods	1
Comprehensively explains any differences with references to changes made in the filtration method	[2]
OR	
Briefly explains any differences with minimal/no reference to changes made in the filtration method	[1]
Subtotal	3
Description	Marks
The water you get from filtering is still impure – it has coffee dissolved in it. Name one way you could get the water pure (that is, get the dissolved coffee out of the water). Explain how the method you have named works.	
Recognises that distillation will purify the water	1
Recognises that distillation involves the four steps:	
• boiling the water	[1]
• capturing the steam	[1]
• cooling the steam to turn it back to liquid water	[1]
• collecting the liquid water.	[1]
Subtotal	5
Results and questions total	15