Hand Warmers

Pupil Sheets

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Pupil's sheets

This section provides some sample guides and worksheets that can be used in class for activities 1 and 3.

Activity 1

1. Similarities and differences table: 'Exploring Hand Warmers' and story time.
2. Question sheet for reuseable hand warmer
3. Question sheet for disposable hand warmer

Activity 3

1. Investigating solubility
2. Making a reuseable handwarmer
3. Fair testing and reliability testing discussion sheet

Exploring hand warmers

	In what ways are the hand warmers similar?	
Comparing reuseable and disposable hand warmers	They both....	
	In what ways are the hand warmers different?	
	Re-useable hand warmers....	But disposable hand warmers.....

Story time

You have seen how some hand warmers work. They all have different features, for example, some stay hot for a long time, some only stay hot for a short time. The features they have suit the activities they may be used for.

Think of an outdoor activity you enjoy where a hand warmer may be useful. Which hand warmer would best suit this activity? Write a story about this activity and in it include the type of hand warmer you would use and why this type would be best.

Gathering information question sheet

Sodium Acetate – reusable hand warmers

Have a careful look at the reusable hand warmer

Describe what you see?
Think about what its packaging is made from, what does the inside look and feel like, any unusual features?

Read the instructions on the packet to help you answer the questions below

1. How do you activate this hand warmer? Try it for yourself.
2. What do you think might be happening when the hand warmer is activated?
3. How do you prepare the hand warmer for using again? Try this for yourself.
4. What do you think is happening when you prepare it for reuse?
5. How long does it stay hot once it has been activated?
6. Hand warmers can be used in a variety of different activities such as skiing, fishing, hill walking and camping.
   Which activities would you see this hand warmer being useful for? (Think about how long it stays hot for and how you re-use it, its size and its weight.)

Cost: £1.99 for a pair

Question sheet – investigating solubility

1. **What does it mean when we say that a 'substance is soluble'?**
   Discuss this in your group and come up with a definition of the word 'soluble'. Write down this definition in your lab book.
2. **Think of examples of soluble substances you have met at home?**
   Hint – the kitchen is a good place to find many soluble substances. Write these down in your lab book.
3. **Think of ways that you may have used to speed up how fast a substance dissolves?**
   In your lab book write the title, 'Ways to speed up dissolving'. Write down your 'ways' underneath the heading. We will now call these factors.
4. **You should now decide as a group which one of these factors you would like to investigate.**
   In your lab book copy and complete the next sentence:
   We are going to try to find out if .....speeds up dissolving.
5. **You now need to plan how you will carry out your investigation.**
   You will need to think about fair testing and reliability.
   - How will you make your investigation fair?
   - How will you make your investigation reliable?
   - How will you change the factor that you are investigating?
   - What will you measure?
6. **Write a description of how you will carry out your investigation in your lab book.**
   You can use:
   glass beaker
   glass stirring rod
   spatula
   thermometer
   sugar (lumps, granulated and caster)
   water (hot, cold and warm)
7. **Show your description to your teacher.**
8. **You are now ready to carry out the experiment. All your results and observations must be clearly written in your lab book.**
9. **Write your conclusion in your lab book.**

Making a reusable hand warmer

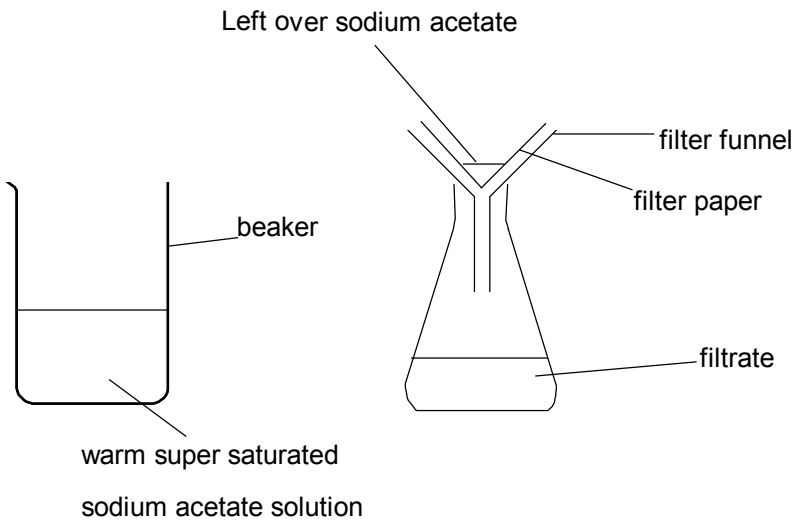
You will now use the information you have learned about methods that can increase the solubility of a substance to make your own hand warmers.

You will need:

- 100 cm^3 beaker containing 20 cm^3 of water
- Hotplate
- Spatula
- Filter funnel
- Filter paper
- Conical flask
- A tub of sodium acetate
- Plastic bag
- Hair snappers

What to do:

1. Make a warm super saturated solution of sodium acetate using the information you learned during your investigation.
2. Set up the equipment shown below.



3. Filter your super saturated sodium acetate solution to remove any last remaining solid.
4. Place a hair snapper into the clear plastic bag.
5. Carefully pour the warm filtrate (warm it again on a hotplate if necessary) from the conical flask into the clear bag. Leave it to cool until your next lesson.
6. Carefully activate your hand warmer by snapping the hair snapper. Try to avoid nipping the bag when doing this as it may split and start to leak.

Fair testing and reliability

Example – fair testing

What does fair testing mean?

Below is a conclusion made by a pupil, Gordon, carrying out an investigation into the speed that potatoes cook.

We found out that the hotter the temperature of the water the quicker the potatoes cooked.

The lab book showed that pieces of potatoes had been put into water at 30°C, 50°C and 90°C. The potatoes that were in water at 90°C cooked in 10 minutes. The potatoes that were in water at 50°C had cooked after 30 minutes and the potatoes in water at 30°C had not cooked after 45minutes.

Discuss this in your groups

- Was the conclusion made by Gordon correct? Discuss this in your group.

  Another member of the group, Lucy, had written in her lab book:

  30°C – whole potatoes used

  50°C – decided to cut the potatoes in half

  90°C – small pieces of potato used this time

- Why is this information important? Discuss this in your group.
- Is the original conclusion made by Gordon correct? Explain your answer.
- Write in your lab book what is meant by 'fair testing'.

Example – reliability

What does reliable mean?

Gordon goes to an after school club. The first time he goes, his Mum is on time to pick him up.

Can we say that Gordon's Mum is reliable?

If she picks him up the second time on time, can we say she is reliable?

Discuss this in your groups

- How many times would Gordon's Mum need to be on time before we could say for definite that she is reliable?

  Gordon and Lucy's group carried out an investigation to find out if potatoes cook faster if they are cut up into small pieces. Their conclusion was:

  We found out that the smaller pieces of potato do not cook faster than big pieces of potato.

  The teacher noticed that the experiment had only been carried out once.

- Is this a reliable result?
- Why is it not a valid conclusion?
- How many times should the experiment have been carried out?
- Write in your lab book what is meant by 'reliable results'.

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