MODULE: *Chemical Change*

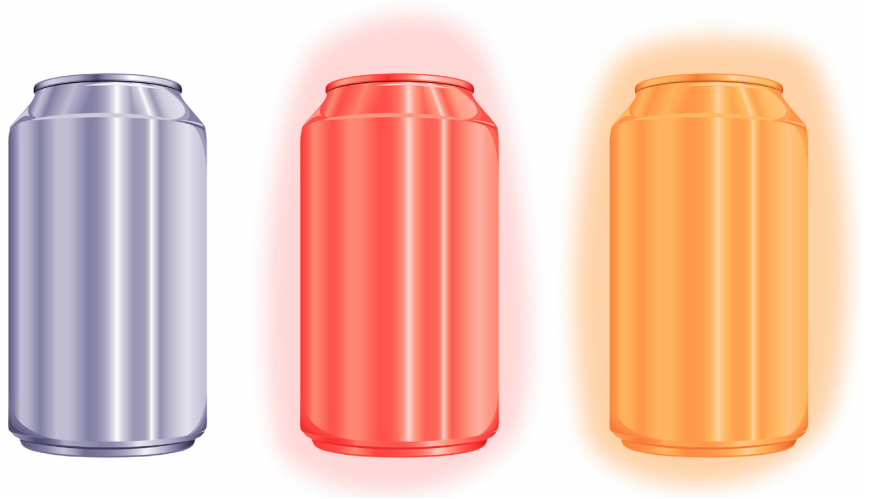
Episode 1: Chemistry Watch

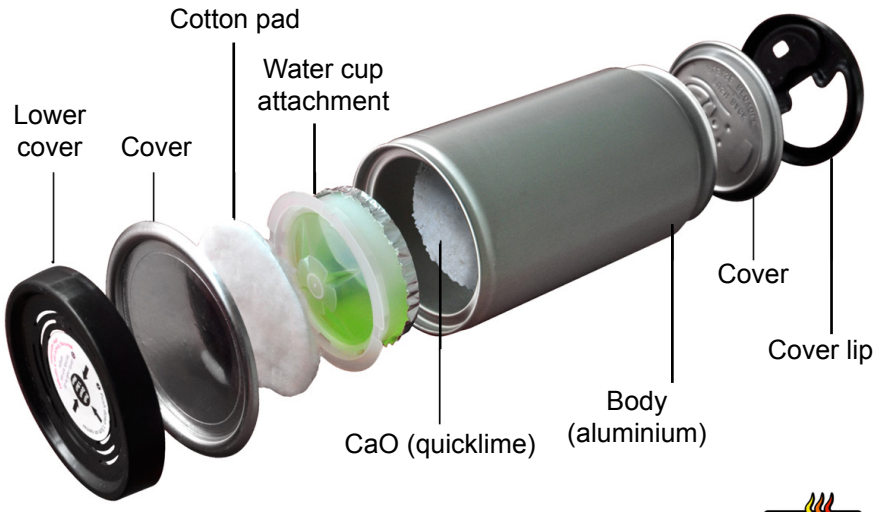
Activity Sheet 1.3 Investigating hot can chemistry

Part 1

Read the information below about the reactions that take place in Hot-Cans.

Calcium oxide + water →	Calcium hydroxide	+	**HEAT**





Hot-Cans usually use the calcium oxide/water exothermic reaction shown above to heat up drinks and food, although other reactions are possible, such as calcium chloride and water.
Some products heat the drink in the compartment in the centre of the can. The calcium oxide/water reaction takes place in the outer compartment of the hot can (see above).
The calcium oxide/water reaction takes place in the central compartment of the hot cans produced by Hot-Can Kazakhstan. The drink is in the outer compartment.

Part 2: Hot can chemistry investigation

Investigation brief: Design a laboratory model of how a self-heating can for coffee or tea works for a demonstration at a School Science Fair.

The exothermic reaction between calcium oxide and water provides the energy to heat the drink in a hot can. You will need to test different amounts of calcium oxide/water mixes to see which achieves the highest possible temperature change of the drink, so that visitors at the event can see a noticeable rise on the thermometer – and will be impressed!

Plan and write a report on your design for your teacher to check. Your teacher will then demonstrate this for your class.

1. Summarise the problem your group was set.
2. Think about and write down your hypothesis.
3. Draw up a design.

4. Write a plan to test your hypothesis. This will:
    - use the basic laboratory containers, equipment and materials list provided to make a laboratory ‘model’ of a self-heating drink can.
    - enable investigation of the amounts of calcium oxide/water needed to generate the highest temperature rise of the drink sample.
    - take note of the room temperature of the drink and the amount of drink being heated at the start.
    - give an estimate of the time it will take to set up, collect the results and finish.
    - include a list of safety precautions which should be taken.
5. Make a labelled drawing of the apparatus you suggest should be used to demonstrate the model of the hot can.
6. Show and explain your design to your teacher.

Part 3

After your teacher has demonstrated the hot can model, in your group summarise the key findings of the investigation. These will be used in a report:

Finding 1:

Finding 2:

Answer the following questions giving reasons and justification for your answers:

1. Why do you think it is important to insulate your outer container?
2. Why do you think that the calcium oxide/water reaction is a particularly good one to use in self-heating cans?

Part 4: Evaluation

1. How well do you feel you and your team carried out the investigation design?
2. How well did you work in your team?