"Endothermic Reactions"

Subject: Chemistry

Sensor: Temperature

Overview:
There are a few reactions in Chemistry where energy is absorbed from the surroundings during the reaction.
When this happens, the temperature of the reactants drops and an endothermic reaction has taken place.
This simple experiment can be used to show the difference between a chemical or physical change. It is also a simple rate of reaction experiment in that you can vary the starting temperature of the water, size and shape of the antacid.

Equipment required: LogIT Datalogger
Temperature sensor (HiTemps or ProTemps with extension cables)
Small vessel or beaker
Antacid such as Alka-seltzer (Sodium Bicarbonate and Citric Acid)
Water
Salt or sugar

Hazards:
Make sure the water is not too hot for the ability of the pupils. Water temperature above 55 °C will scold children.
Care must be taken if using kettles to heat the water. Allow the temperature to cool before use.
Place the tubes over a tray to catch any spilt water.

Setup:
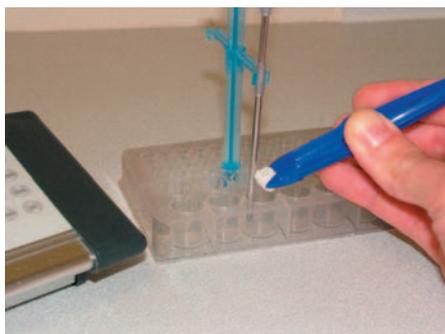
1. Connect the Temperature sensor to the datalogger.
2. You can use a clamp stand to hold the sensor if required.
3. Place the water into the small vessel or beaker.

Note: The picture shows the use of a ProTemp but a HiTemp could also be used. In the picture we have used a Micro Science kit with the Alka-Seltzer about to be introduced to the water. This allows for the use of small amounts of water and Alka-Seltzer (2.0 ml of water and 0.3 g of Alka-Seltzer in this example although you could alternatively use 200 ml of water and a whole tablet).

Method:
1. Switch on your datalogger or setup your software ready to start taking readings.
2. When the temperature has reached a stable value start logging.
3. Add the Alka-Seltzer tablet.
4. Record until the temperature no longer falls.
5. Stop logging.
6. Repeat for different temperatures of water, different size or different shape of Alka-Seltzer.

Note: If you are varying the temperature of the water, you could use more channels and record the temperature changes on the same graph. This could also be achieved by using the 'Overlay' feature found in datalogging software.

Results:
How much of a temperature change was there?
How does this show that a reaction has taken place?

Going further:
How would the shape and size of the Alka-Seltzer affect the graph?
Try using vinegar instead of water. What might happen to the speed of the reaction and shape of graph this time?