# Activity: Making honey crystals

The presence of sugar crystals in honey affects the honey’s texture and palatability. In this experiment, you can investigate how crystals form in honey.

## Background

Honey is a supersaturated solution of sugars (about 70 percent sugar and 20 percent water). Crystals form in honey when the sugar falls out of solution. Once out of solution, the sugar acts as a seed, or nuclei, and other sugar molecules gather around it, forming a particle with a precise, regular arrangement – a crystal.

The size and shape of a honey crystal depends on the type and amount of sugar in the honey. It is also affected by moisture content, temperature, humidity and the size of starting nuclei. Large, hard sugar crystals can spontaneously form in honey, particularly around impurities like dust, pollen, wax or even air bubbles.

Different types of honey have crystals of various sizes. Runny honey has no crystals, whereas creamed honey has very small crystals giving it a soft, spreadable texture. Honey manufacturers control crystallisation during honey processing to get the desired end product.

In this experiment, you will design a method for making creamed honey with small crystals for a local honey manufacturer.

## Aim

To observe honey crystal formation and discover how the size of nucleating crystals affects honey crystal size during formation.

## Materials

Runny honey   
Creamed honey   
Honey crystals (look at the top and sides of an old honey jar)  
250 ml glass beaker  
Glass stirring rod  
Heating block  
Measuring cylinder  
Stirring rod  
Boiling water  
3 shallow dishes (for example evaporating dish, Petri dish or plastic bowl)  
Plastic wrap

## Method

1. Measure 30 ml of water into a beaker. Heat and stir in runny honey until no more will dissolve. You will reach a point where some honey stays at the bottom of the beaker no matter how much you stir it. This is a supersaturated solution. It is important that your solution is as saturated as possible for this experiment to work.
2. Thoroughly clean and dry the shallow dishes.
3. Pour 20 ml of the saturated honey solution into one of the dishes and cover with plastic film. Poke 10 holes in the film.
4. Pour 20 ml of the saturated honey solution into a second dish. Add a small amount of creamed honey and cover with plastic film. Poke 10 holes in the film.
5. Pour 20 ml of the saturated honey solution into the third dish. Add a few large honey crystals and cover with plastic film. Poke 10 holes in the film.
6. Leave till crystals form. This experiment will work best if this step is at room temperature (10–21ºC).

## Results

Describe what you see in each of the three dishes. You may use diagrams to help you.

## Conclusion

* What is a supersaturated solution?
* Why is it important for this experiment that you start with a supersaturated solution?
* From the results of your experiment, would you recommend that the honey manufacturer adds no crystals during honey processing, adds small crystals or adds large crystals?

## Extra for experts

Design an experiment to find out more about honey crystal size. Choose one of the following ideas to investigate:

* Does the number of holes in the lid affect crystal formation?
* Does temperature affect crystal formation?
* Other, as approved by your teacher.