Jigsaw puzzle nucleation

Instructions for demonstrators

## About this activity

‘Jigsaw puzzle nucleation’ is a hands-on activity about crystal nucleation using jigsaw puzzles. It is a single-player, timed challenge and there are plenty of talking points about nucleation and different ways a nucleus could form.

## Key information

Science topic(s): Crystals, crystallisation, framework materials.

Age range: 3+, including adults.

Activity duration: 3-5 minutes

Health and safety considerations: N/A

A box of puzzle pieces

Description automatically generatedSpecial requirements: N/A

## What’s in the box?

1. These instructions for demonstrators.
2. Risk assessment.
3. Materials for the activity:
   1. Small jigsaw puzzle (12 or 16 pieces is ideal)
   2. Stopwatch timer (optional – you could use the timer on a mobile phone)
4. Information to display about the activity (laminated A4 sheet).
5. Postcards about the activity to give out (A6 card).
6. Stickers for giving out to/counting participants.

## How to set up this activity

1. If using a set with multiple jigsaws inside, sort the pieces into piles of each jigsaw picture.
2. Print and display a large version of the jigsaw puzzle image as a reference for the people that will be building the jigsaw.
3. Display the laminated information and postcards somewhere nearby (e.g., on a table) and have the stickers on hand to give out when participants have completed the activity.

## How to demonstrate this activity

1. Invite a person to build one of our jigsaw sets. Suggest for them to build the 12- or 16-piece puzzle, however any of the four sizes works for this activity.
2. Allow the person to build the jigsaw as quickly as they can, anyway they like, with a 2-minute time limit on building the puzzle.
3. Once the puzzle is built, talk to the person about the method they used to build the jigsaw. Suggest other methods, such as making small clusters and combining them or doing the edge pieces and then the middle pieces and discuss how they compare to the method they chose.

Potential discussion points:

Nucleation is the initial step in crystallisation, and it determines the final crystal’s structure, size and shape. Similarly to building a jigsaw puzzle, there are multiple different methods of nucleation that results in the same outcome, however you still need to use specific molecules in specific places to reach the same outcome.

1. Describe what **nucleation** is and allow the person to rebuild the same puzzle using a different method, timing it with the stopwatch again.
2. Discuss the time difference between the methods of building, which was easier to complete and any other factors that affected their second time completing the jigsaw.
3. Discuss how important nucleation is in crystallisation and why we research it.

## Taking this activity further

You can use the activity to discuss any of these subjects:

* Defects from missing pieces
* Growth of the nucleus to produce the final crystal

## How to pack this activity away

* Disassemble the jigsaw into its pieces and put back into its box.
* Discard any broken pieces.
* Put the stopwatch timer back into its box.

## This activity goes well with…

* The Nucleation Game
* Magnetic tile crystals
* Crystallisation of a magic crystal tree

## More information about the science and research

Nucleation is the first step in crystallisation and it forms a small cluster or building block that looks like the final crystal structure. Nucleation determines the shape, size and properties of the crystal. The second step of crystallisation is the growth of the nucleus. More molecules, atoms or ions add to the nucleus until it reaches its full size crystal.

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