

22: Silver Fractals

Fractals are geometric shapes found in nature. They are made up of a series of repeating patterns. A tree, for example, divides into branches which further subdivide into smaller branches which ultimately subdivide into twigs. At each stage of division the pattern formed is a smaller version of the original. Fractals were developed by Benoit Mandelbrot in 1967 during a study of the coastline of Britain. You can make your own fractals by growing silver crystals.

What you will need

access to an overhead projector
2 paper clips
250 cm³ measuring cylinder

ammonia solution
silver nitrate solution
dilute hydrochloric acid

eye protection

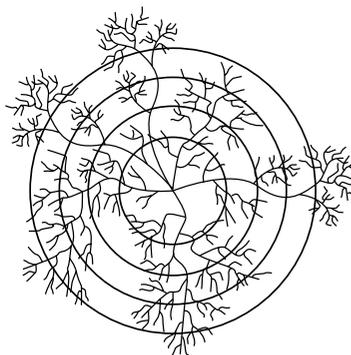
petri dish, 15 cm diameter and 2 cm high
power pack (range up to 22 V)
stands/clamps/boss head
filter paper

What you do

1. Add 200 cm³ of silver nitrate solution into a beaker and add 10 cm³ of ammonia solution to this.
2. Add 300 cm³ of water to the beaker.
3. Now pour about 200 cm³ of this solution into a petri dish which has been placed on top of an overhead projector.
4. Partially open one of the paper clips and attach it over the edge of the petri dish so that it is immersed in the solution.
5. Connect this to the positive end of the power pack by using leads and crocodile clips. This is the positive electrode: the anode.
6. Straighten out the second paper clip fully. Attach a lead to this and hang the lead over a clamp until the paper clip *just* touches the surface of the silver nitrate solution in the middle of the petri dish. Connect the other end of the lead to the power pack.
7. Set the voltage at around 20 V and switch on the power pack.
8. Watch carefully. A silver fractal should form around the paper clip in the middle of the petri dish.

OTHER THINGS TO TRY

You may like to make fractals of other metals from their salt solutions and compare the shapes.



Fractal pattern



eye protection
must be worn



IRRITANT

ammonia
hydrochloric acid