

Student sheet

In this practical I will be:

- Setting up a practical enquiry for growing crystal gardens, ensuring that the experiment is fair.
- Reporting on the size, colour and rate of growth for the different crystals.
- Using my scientific knowledge and understanding to explain the results of the experiment.

Introduction:

You are an ancient Roman science-artist living in the town of Herculaneum. Whilst walking by the docks, you notice that there are salt crystals growing on the hull of a few of the boats. Not only this, but the crystals vary in size and on a particularly dirty boat, there are crystals of different colours. Like all good science-artists you decide to investigate further...

Equipment:

- Eye protection
- Large glass jar with lid
- Glass rod
- Forceps
- 8% Water glass (**irritant** solution)
- Water
- 2 good sized crystals of the following (see hazard symbols)
 - iron(II) sulfate
 - copper(II) sulfate
 - calcium nitrate
 - manganese(II) sulfate
 - iron(II) aluminium sulfate
 - potassium aluminium sulfate
 - iron(III) chloride
 - zinc sulfate
 - (nickel sulfate demonstration only not for students)
 - (cobalt chloride demonstration only not for students)

Method:

Eye protection and gloves must be worn

1. Into a large glass jar pour enough water glass solution to one-third fill the jar.
2. Add enough water to fill the jar to the neck of the jar.
3. Mix the solution of water glass in water well using a glass rod. Take care not to spill the solution.
4. Let the water glass in water solution stand for a few minutes to allow it to clear of any air bubbles.



5. Using the forceps, select one large crystal of each of the solids provided and carefully drops each crystal into the water glass solution.
6. Watch carefully. Describe what you see and write down the colour of the compound.
7. Try not to disturb the jar while the 'garden' is developing. Put the lid on the jar and leave for a week.
8. Wash your hands.

Going further:

If time allows you could try using different dilution strength solutions of water glass and describe any differences between the results of using different dilution strengths.

Theory:

A 'garden' can be grown from crystals.

The water glass is a solution of sodium silicate and is known as 'water glass'. By adding more water you are forming a dilute solution of sodium silicate. When you put the crystals of metal salts into the sodium silicate solution they seem to act like seeds and grow long shoots. These long shoots are long tubes of the metal silicate and the colour depends upon the metal being used.

