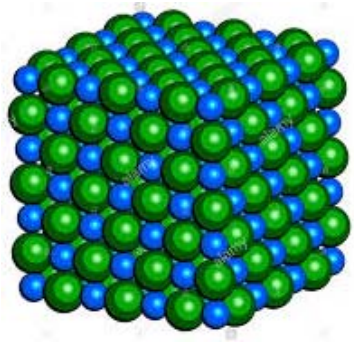
How to grow synthetic crystals

What is a crystal?

A crystal is a solid where building blocks such as atoms, ions or molecules form a periodic arrangement. A crystal is defined by its crystal lattice, a small imaginary box translated in 3 dimensions. Crystals are commonly recognized by their shape, consisting of flat faces with sharp angles.



Examples of crystals in nature: rocks, ice

What is a synthetic crystal?

A synthetic crystal is grown artificially in laboratories or industry and in most cases does not occur in nature.

Examples of synthetic crystals

- crystalline silicon (made out of silicon atoms): used in electronics, solar panels
- quartz (made out of silicon and oxygen): used in watches and radio transmitters
- diamond (made out of carbon): jewelry and cutting tools

How to grow an alum crystal?

What is an alum? General formula: $XAl(SO_4)_2 \cdot 12H_2O$

X= K→ potassium aluminum sulfate dodeca hydrate (potash alum)

Some alum usages: astringent (medicine), flocculent (water purification), inhibits the growth of bacteria responsible for odor (deodorant), food (pickling, backing powder)

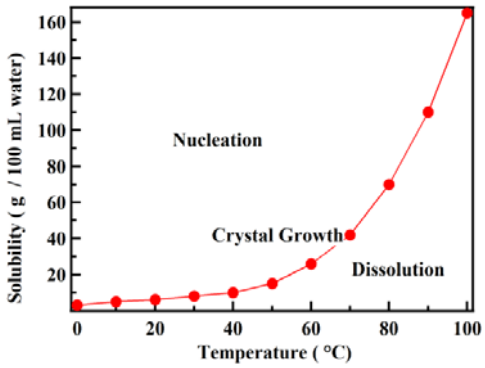
Purpose

Growing these crystals is relatively easy, can be done at home and will teach you a lot about the principles governing crystals growth.



Recipe for growing alum crystals (synthetic gems)

1. Make a saturated solution of alum at room temperature. The easiest way is to make a supersaturated solution at high temperatures and let it cool to room temperature.



Example: Dissolve 100 grams of alum (100g ~5 tbsp) in 200 mL of hot water (heat the water a little bit below boiling). Suggestion: 1: 2 ratio alum to water.

During cooling the excess alum will precipitate out of solution and form crystals at the bottom of the jar. Wait for 10 hours. The solution that is left is saturated. Filter the solution using a coffee filter and keep it.

How do the crystals look? Clear or cloudy, smooth or rugged, symmetrical or asymmetrical?

Suggestion: try different ratios of alum to water and notice how fast the crystallization occurs when cooling. Add food coloring to the solution to change the crystals color. Seed crystals from evaporation of the solution

Allow the saturated filtered solution to evaporate at room temperature: tiny "seed crystals" with octahedral shape will be formed after a few days.

How are the crystals looking? Crystals grow slowly therefore are optically transparent

2. Suspend one of these crystals using dental floss and dip it in in some saturated solution. Cover the jar. The longer you wait the larger the crystal will grow. Remember to add saturated solution from time to time.

Crystals can be grown on different surfaces as well. Take any objet such as an egg shell, wood stick and cover it with glue. Dip the object in some alum powder and then introduce it the supersaturated or saturated solution. Very quickly the surface will be covered in tiny crystals. To preserve the crystals (protect from humidity) coat the crystals with few layers of clear nail polish.