



Prize Winner

Crystal Investigation

Year 9-10

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Crystal Investigation

Investigation Question:

How to develop a good-quality potash alum crystal which has a considerable level of smoothness, sharpness and clarity?

Hypothesis:

A crystal that is smooth and clear will be produced if it is kept in a stable environment and with a warm temperature.

Research:

The type of crystal made from potash alum is a fascinating and beautiful crystal to make. The crystal is processed from alum or potassium aluminium sulphate ($\text{KAl}(\text{SO}_4) \cdot 12\text{H}_2\text{O}$). There are multiple uses for the chemical compound including cosmetics, deodorants, tanning and textiles.

The growth of a crystal constructed through crystallisation. This process relies on the theory of solubility, which represents the amount of a solution (solute) dissolved in solvent to create a solution. A relevant example of this is that potash alum has the solubility of 14g/100mL at 20°C or 36.8/100mL at 50°C. The solution should be completely saturated for the best results.

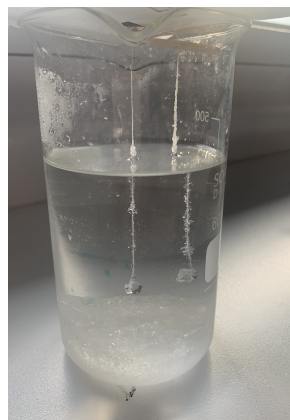
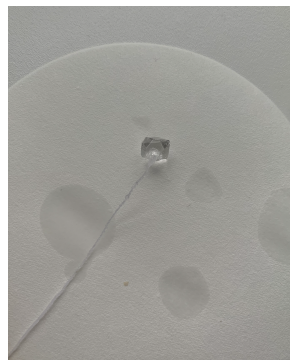
The use of a warmer temperature is more beneficial for making a high quality crystal. You can also refrigerate the crystal however it will be less clear because of the higher rate of crystallization.

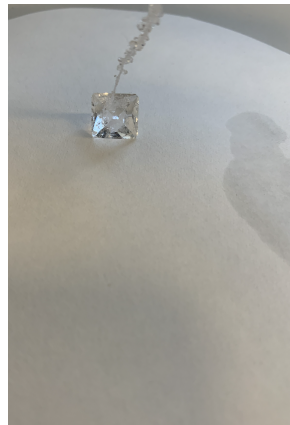
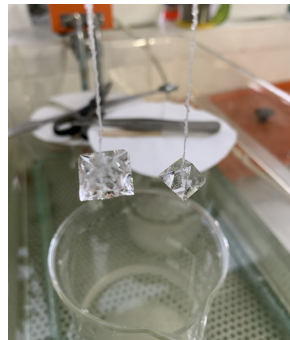
Materials:

- . 30g of aluminium potassium sulphate
- . 200ml of water
- . beaker
- . stirring rod
- . thermometer
- . hot plate
- . electronic weighing scale
- . filter paper
- . funnel

Method:

1. Weigh 30g of potash alum in an electronic weighing scale
2. Add this to 200ml of water into a beaker and place on a hot plate
3. Heat the solution until it reaches 60 degrees celsius, then take it off the hotplate and set aside for cooling
4. After cooled, filter solution into a alternate beaker
5. Keep the beaker in a water bath in 25 degrees celsius
6. Seed crystals will grow in that solution, filter the solution and take the best crystal
7. Attach this crystal to the string with glue

Date/time	Description of what I have done, any problems i faced and resolutions	Crystal description	images
June 7	Today I checked my crystal after gluing it. It grew in size but was still quite small. There were also tiny crystals forming above the main crystal.	. small, clear and visible edges	
June 14	My crystal is getting bigger and the edges are becoming more sharp. Today I filtered the solution in my beaker. In the bottom of the beaker there were	. sharp and bigger	

	many crystals that I transferred into a new beaker.		
June 21	The crystal is beginning to increase to its full size and it is smooth.	Smooth, bigger	
June 29	The last day I checked my crystal. In the image you can see I have made two. One of the crystals is immensely clear and the other one is also large in size.	Very clear, large, sharp	

Conclusion

A high quality crystal with smoothness, clarity and size will be produced if a saturated solution is put in the correct environment and consistent temperature.