

Highly Commended

Crystal Investigation

Year 7-8

Willem Koehne

St Andrew's School



Growing a crystal in a constant, dark, stable environment.

How human interaction, vibration, changing temperature and light affect crystal growth.

0611 - 078
Student(s): Willem Koehne


Coordinator: St Andrew's School
School Phone: Kathryn Howie
08 8168 5555

Gender: M
Patent Sought: N

App code: 3957548

Year Level: 7 - 8
Group Entry: N
Students: 1

Category: Crystal Investigation
Project Title:



Willem Koehne
St Andrew's School



Encouragement Award

My Hypothesis:

Growing a crystal in a dark environment with no human interaction (that is, without any human contact - no air conditioning, vibration, fresh air, dust, pollution or light) and at a consistent temperature at a range of 12°C - 14°C.

Introduction:

I have been trying to grow POTASH ALUM crystals over the last few years. Sometimes it works and sometimes it doesn't. I have been trying to work out why it works sometimes and not at other times.

I know, now, from my research online, that a good crystal is clear, has a good shape and strong, sharp edges. When I started growing crystals I thought they just needed to be as big as possible and I didn't worry about colour or shape. I found that you could grow big, but messy, crystals almost overnight, but it took a lot longer to get a nice shape and clearness.

I grew my first crystals with really hot water and dissolved a lot of potash alum, but now I know that you need to be more careful with proportions of all the ingredients and temperature to make a perfect crystal. I also used to use cooking alum from a kitchen shop which is not as clean as science alum from a science shop. I have also learned to use clean, distilled water rather than just water out of the tap. Another website suggested that using cotton or string to hold the seed crystal made the crystals grow badly so I used fishing line instead as it was smoother.

Even with all the right ingredients and using fishing line instead of cotton and clean beakers I still found that the crystals grew differently.

My Method:

I decided to grow my crystal in a completely dark space, at a constant temperature, in a cool dry environment. I used a high cupboard in a storage space in our garage.

I grew several seed crystals by evaporating some potash alum solution in a saucer. I had to get my dad to help stick the seed crystals on to some fishing line with super glue.

I heated the distilled water in a glass jug to 60°C in a microwave and dissolved 150 grams of potash alum into 1 litre of water and stirred it for a long time. Then I let the solution cool down to about room temperature. I poured the solution equally into a glass beaker through a paper coffee filter in a funnel and placed the beaker in a cupboard that is only used for storage. and nobody goes in to. I covered the beaker with a tissue.

The storage room has no heating in it and does not get used. The crystal grew in a very stable undisturbed environment where the temperature was always between 12°C and 14°C.

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My seed crystals



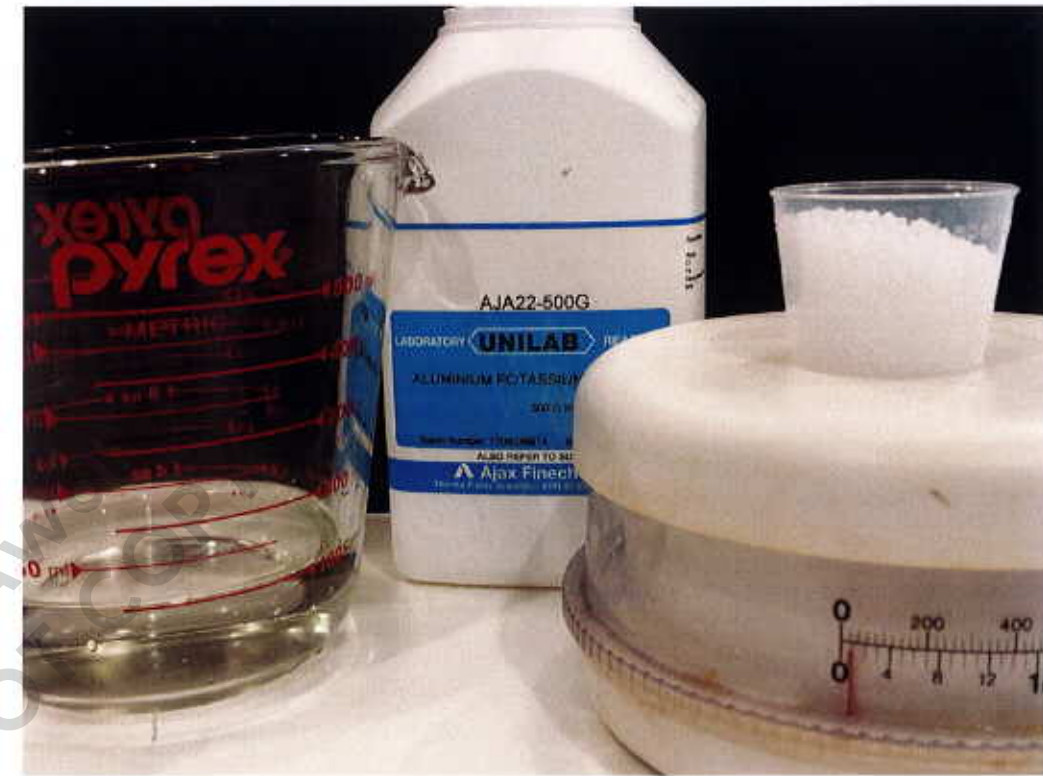
My seed crystals



The most perfect of my seed crystals
which I chose to grow

My Crystal Growing Log:

Date	Observation
09.06.20	I made a solution for growing seed crystals by dissolving 25gms of Unilab Aluminium Potassium Sulphate into 150ml of heated distilled water. I poured solution onto a flat plate and covered with a colander to evaporate.
18.06.20	I used plastic tweezers to pick out five same sized seed crystals. I stuck the seed crystals to fishing line using super glue with help from dad. Some did not stick but I chose one that worked. I dissolved about 150 grams of potash alum into a litre of distilled water heated in the microwave. Then I poured the solution into a glass beaker. After the water cooled I tied my seed crystal to a pencil and hung it in the solution. I placed the beaker in a cupboard in a storage space in our garage.
20.06.20	I checked the crystal and saw it had started to grow and already had the diamond shape although quite small. Some other crystals were in the bottom of the beaker.
26.06.20	The crystal is a bit bigger and looks much the same in shape.
01.07.20	I mixed up another lot of potash alum solution and added some to the beaker to try to make it grow a bit more.
07.07.20	The crystal is bigger (about a centimetre across) but it also not as clear as I wanted it to be.
12.07.20	The crystal is larger and has quite a good octahedron shape although it is a bit cloudy
21.07.20	The crystal is bigger but the centre is a bit cloudy. The shape is quite good but some of the edges are not straight.
01.08.20	The crystal is a bit bigger but the shape is not as good as before. The basic octahedron shape is there but the edges are not straight.
06.08.20	Not much different to 01.08.20. I added a small quantity of fresh potash alum solution to the beaker.
10.08.20	The crystal is a bit larger but hasn't really changed much in shape or clearness
15.08.20	The crystal has a basic octahedron shape but it is not as sharp and straight as I had hoped. It is a bit cloudy in the middle. I think perhaps the super glue I used to attach the string might have spoiled the seed crystal and made the crystal not grow properly.



Weighing the Aluminium Potassium Sulphate



Making seed crystals (our dust protector is a lettuce spinner basket)

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My Conclusion:

Compared with my previous attempts to grow crystals, this experiment had a better result - although still not as good as I had hoped.

By growing the crystal very slowly and in a very stable, cool, dry environment I succeeded in getting the crystal to grow in the basic octahedron shape.

I think I still did not get the conditions clean enough to make the crystal grow with the clarity and sharpness that a really good crystal should have.

I conclude that crystal growing requires very stable conditions and slow evaporation of the solution between 12°C and 14°C. The seed crystal has to have a regular shape and be very clean.

Acknowledgments:

My dad, who helped me glue the seed crystal to the fishing line and came with me to buy the potash alum from lab supply shop.

My mum, who took my Oliphant Science Awards Crystal Investigation presentation to be printed for me (plus bought the padded bag).

References:

Grow Potassium Alum or Synthetic Ruby Crystals
<https://www.thoughtco.com/grow-potassium-alum-or-ruby-crystals-606235>

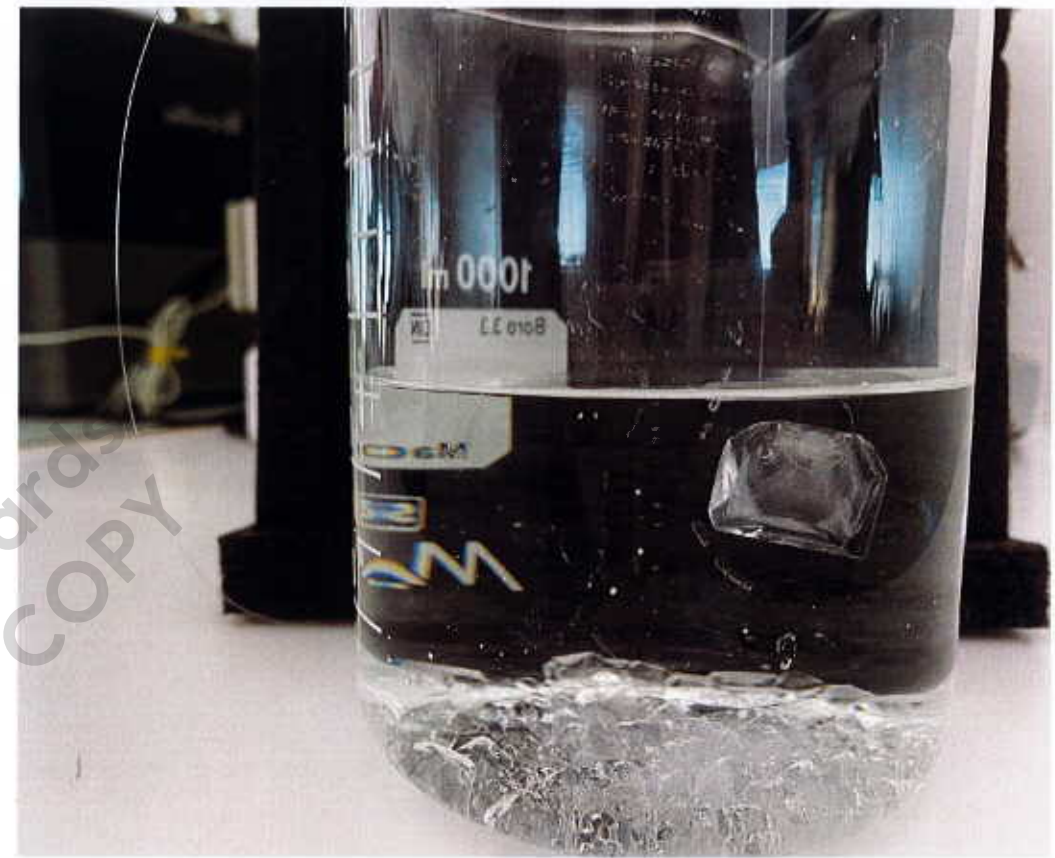
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Growth rate of potash alum crystals: comparison of silent and ultrasonic conditions
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The last day of my crystal in the potash alum solution 15/08/20.

