

**Does the size of the crystal effect it's clarity?**

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## **1. Introduction**

I have had two years of experiences of growing and competing in Oliphant Science Awards and this is my third year. This year, I will improve by checking the crystals more often, because last year I didn't check the crystals for a month, so some bugs got in to the solution with some kind of fur inside.

## **2. Hypothesis**

Does the size of the crystal effect it's clarity?

## **3. Materials**

300g of alum potassium  
Fishing rod  
5 beakers  
2100ml of demineralised water  
1 rectangular baking dish

### **Materials for seed crystals**

100g of alum potassium  
700ml of demineralised water

To make the seed crystals I needed 100g of alum potassium, 700ml of demineralised water and a rectangular baking dish. First, I dissolved 100g of potassium into the 700ml of demineralised water and let it cool down. Later, I moved it to a safe place and let it stay there for 2-3 days.

After I had several seed crystals I tied them to the pop sticks using fishing rod and slip knots. I reheated the old seed solution and poured 500ml into a beaker. Then I poured the remaining solution into beaker 2. I heated 3 beakers and in each of them is 500ml of demineralised water and 50g of potassium.

#### 4. Observation

12/05/2024

Out of all the seed crystals I took the top 5 and kept some backups. I measured the 5 crystals and weighted them. Their sizes were good but some of the larger crystals were a bit cloudier. The shape of crystal 1& 5 were amazing. Crystal 2&3 were okay but crystal 4 was not good.

Date		1	2	3	4	5
	<b>Beaker</b>	<b>Beaker</b>	<b>Beaker</b>	<b>Beaker</b>	<b>Beaker</b>	<b>Beaker</b>
12/5/2024	<b>Measurement</b>	10mm x 6mm	15mm x 12mm	10mm x 10mm	17mm x 16mm	13mm x 9mm
	<b>Weight</b>	5g	5g	2g	3g	1g
	<b>Description</b>	Perfect shape, a little bit clear, and a little bit cloudy.	Good shape, really cloudy, and a tiny bit clear.	Okay shape, mostly clear, and a tiny bit cloudy	Not so good shape, really cloudy, and a little bit clear.	Perfect shape, super clear, and not cloudy.



Crystal 1



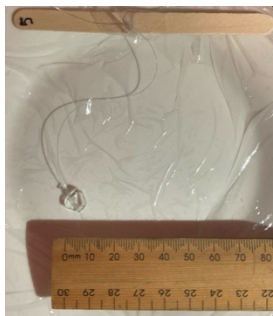
Crystal 2



Crystal 3



Crystal 4



Crystal 5

1/06/2024

I weighted and measured the crystals but the scale wasn't working properly so the weight isn't precise. I have three good crystals for the competition and a crystal that's diamond shaped. Most of the other crystals are in a good shape. I took out crystal 1 because it was clear, diamond shaped and has a good size.

Date		1	2	3	4	5
1/6/2024	Measurement	14mm x 13mm	20mm x 21mm	15mm x 15mm	18mm x 17mm	11mm x 11mm
	Weight	2g	4g	1g	2g	1g
	Description	Perfect shape, really clear, and a bit cloudy	Okay shape, really cloudy, and little bit clear	Good shape, mostly cloudy, a tiny bit clear	Perfect shape, super clear, and a tiny bit cloudy	Great shape, really clear, and a little bit clear



Crystal 1



Crystal 2



Crystal 3



Crystal 4



Crystal 5

**30/06/2024**

When I took photos of the crystals, I found at the bottom of the beaker of solution 1 that there were lots of big clear seed crystals. One of the seed crystals was a pyramid shape and crystal clear, which I named it crystal 6. The second seed crystal was a hexagonal shape with only a few growth lines visible, which I named it crystal 7. I took photos of the crystals next to a two dollar coin to show how big it was. I weighed and measured the crystals. I also took crystal 5 out of it's solution and cut the string for submission because it was good, clear and had a good shape. Crystal 4 had shrunk and slipped out of the slip knot.

Date		1	2	3	4	5	6	7
30/6/2024	Measurement	15mm x 19mm	30mmx 25mm	21mm x 29mm		20mm x 20mm	10mm x 10mm	20mm x 19mm
	Weight	4g	13g	8g		5g	Too light	2g
	Description	I have taken it out of the solution for it to keep it's shape for submission	Not so good shape, really cloudy, and not very clear.	A bit rough shape, mostly cloudy and a tiny bit clear	The crystal slipped out of the slip knot	Perfect shape, a bit clear, and a bit cloudy.	A pyramid shape and crystal clear.	A hexagonal shape, super clear and a few growth lines.



Crystal 1



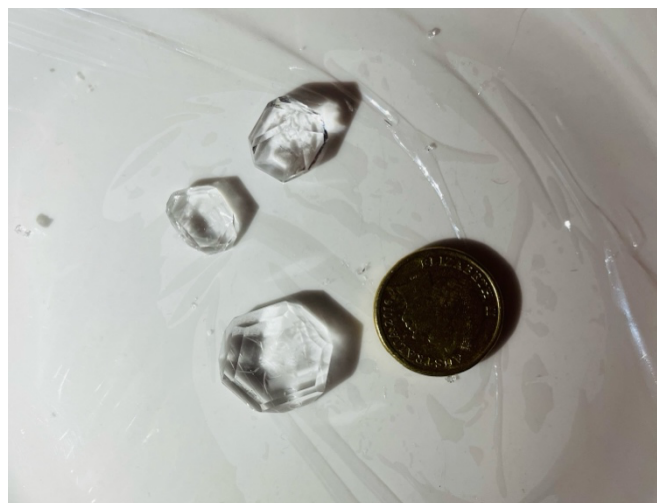
Crystal 2



Crystal 3



Crystal 5



Seed crystals from the beaker 1



**21/07/2024**

Crystal 6 was grown in solution 1 and crystal 7 was grown in solution 4. I had grown them in the old solution so I could experiment to see if the old solution is better than the new. I measured and weighted the remaining crystals. Crystal 7 had slipped out of the slip knot and is now on the bottom of the beaker. Crystal 2 hasn't grown at all and is the same weight and shape. Crystal 3 has grown and shrank at the same time so the sides are a bit lopsided. What surprised me was that crystal 6 has doubled it's weight and size.

Date		1	2	3	4	5	6	7
	Measurement		30mmx 25mm	25mm x 25mm			20mm x 20mm	
	Weight		13g	6g			5g	
21/6/2024	Description	I have taken it out of the solution for it to keep it's shape for submission	Not so good shape, really cloudy, and not very clear. It hasn't grown from much from the last time I measured it.	A lopsided shape, mostly cloudy and not very clear.	The crystal slipped out of the slip knot	I have taken it out of the solution for it to keep it's shape for submission	It is forming a diamond shape and it is still crystal clear.	The crystal slipped out of the slip knot



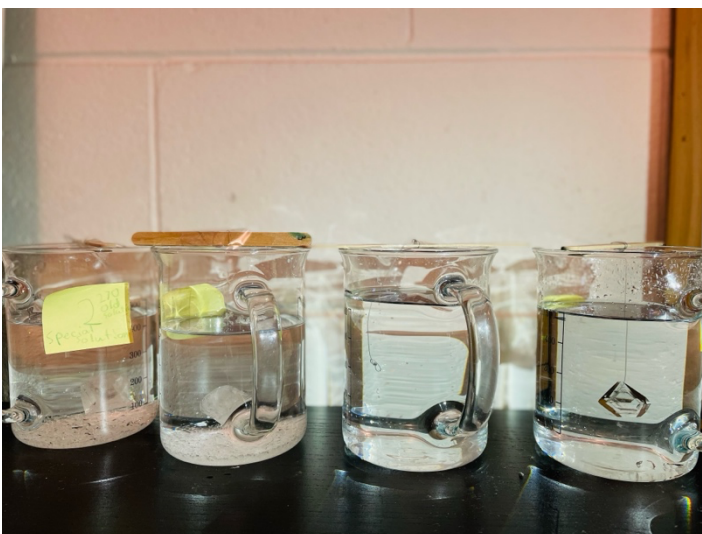
Crystal 6



Crystal 2



Crystal 3



The solutions in order: Crystal 2, Crystal 3, Crystal 7, Crystal 6

## **5. Conclusion**

In conclusion, crystal 2 is the biggest and cloudiest crystal. Crystal 6 is the clearest but it isn't the smallest. This means part of my hypothesis was correct. However, I believe my hypothesis is wrong because crystal 6 is 20mm x 20mm in size and crystal clear like it was still a seed crystal. When the other crystals were about the same size of crystal 6, they were a lot cloudier. So, I understand that it isn't the size that affects the clarity but possibly the solution does. I consider the hypothesis for next year is "Does the quality of the solution affect it's clarity?" I think it is the solution that affects the crystal because all the other crystals (except crystal 7) have grown in the new solution. I got the crystal 6 and 7 from the bottom of beaker 1. I also grew crystal 6 in beaker 1 and lots of potassium had been taken from the solution to grow crystal 1.

## 6. Appendix

		Crystals						
Date		1	2	3	4	5	6	7
		Beaker	Beaker	Beaker	Beaker	Beaker	Beaker	Beaker
12/5/2024	Measurement	10mm x 6mm	15mm x 12mm	10mm x 10mm	17mm x 16mm	13mm x 9mm		
	Weight	5g	5g	2g	3g	1g		
	Description	Perfect shape, a little bit clear, and a little bit cloudy.	Good shape, really cloudy, and a tiny bit clear.	Okay shape, mostly clear, and a tiny bit cloudy	Not so good shape, really cloudy, and a little bit clear.	Perfect shape, super clear, and not cloudy.		
1/6/2024	Measurement	14mm x 13mm	20mm x 21mm	15mm x 15mm	18mm x 17mm	11mm x 11mm		
	Weight	2g	4g	1g	2g	1g		
	Description	Perfect shape, really clear, and a bit cloudy	Okay shape, really cloudy, and little bit clear	Good shape, mostly cloudy, a tiny bit clear	Perfect shape, super clear, and a tiny bit cloudy	Great shape, really clear, and a little bit clear		
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	Weight	4g	13g	8g		5g	Too light	2g
	Description	I have taken it out of the solution for it to keep it's shape for submission	Not so good shape, really cloudy, and not very clear.	A bit rough shape, mostly cloudy and a tiny bit clear	The crystal slipped out of the slip knot	Perfect shape, a bit clear, and a bit cloudy.	A pyramid shape and crystal clear.	A hexagonal shape, super clear and a few growth lines.
21/6/2024	Measurement		30mmx 25mm	25mm x 25mm			20mm x 20mm	
	Weight		13g	6g			5g	
	Description	I have taken it out of the solution for it to keep it's shape for submission	Not so good shape, really cloudy, and not very clear. It hasn't grown from much from the last time I measured it.	A lopsided shape, mostly cloudy and not very clear.	The crystal slipped out of the slip knot	I have taken it out of the solution for it to keep it's shape for submission	It is forming a diamond shape and it is still crystal clear.	The crystal slipped out of the slip knot