



Highly Commended

Crystal Investigation

Year 5-6

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What happens when we grow crystals using diverse types of water - tap water, soda water and saltwater?

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Aim: Our aim currently is to grow 3 crystals using several types of water. The waters we are using are tap water, soda water and saltwater. We are going to be growing the crystals using Potash Alum.

Prediction: We predict that the tap water crystal will grow better than the saltwater and soda water crystals, but the results may be different to what we predict.

Ingredients:

- Potash Alum
- Boiling water
- Soda water
- Salt
- Strings
- Beakers

Journal:

Week 1:

Saltwater: 1 cup of boiling water w/ stirred 2 teaspoons of salt; 2 teaspoons of alum stirred (the alum is dissolving 1st in this solution). No action with crystal growing.

Tap water: 1 cup of Boiling water w/ stirred 2 teaspoons of Alum (the alum is dissolving 2nd in this solution). No action with crystal growing.

Soda water: 1 cup of Soda water w/2 teaspoons of alum (not dissolving at all). No action with crystal growing.

Conclusion: Our conclusion is that the jugs with boiling water works well and the alum has dissolved, but the soda water which is cold is dissolving slowly and has not yet dissolved fully. We used 1 cup of water for each and two teaspoons of Alum for each. We left them in the sun.

Week 2:

It did not work. None of the jugs of water formed crystals which is pretty sad, but we do think we know why. We have examined our fellow lab mate's crystals and asked them how much alum they used they said 2-5 tablespoons, but we put 2 teaspoons. So, we are going to remake them but using 3 tablespoons.

Saltwater: In the saltwater the alum has dissolved
Tap water: In the tap water the alum has dissolved

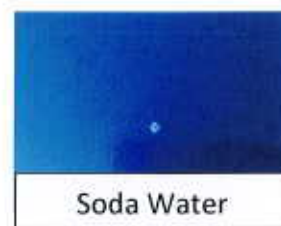
Soda water: At the beginning the bubbles were popping up and spraying everywhere which we know was the soda water.

In conclusion the crystals did not work so we tried again but with 3 tablespoons of alum instead of 2 teaspoons. It does seem to be working.

Week 3

In week three the crystal seeds formed!

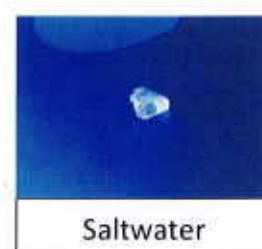
The soda water crystals seeds are really tiny but in the cup on the Bottom it is mainly full of undissolved alum.



The tap water crystals have fully formed, and they are hard and strong, they are what we were hoping for.



The saltwater crystals have fully formed and have succeeded incredibly the saltwater crystal seeds are big and hard and look amazing.



Then what we did was, tied them all to a string and poured 1 cup of boiling salt water and 3 tabspoons into a cup then we added the salt water crystal to in it and did the same with the tap water but without salt, we couldn't do the soda water crystal because we had run out of soda water.

Week 4

The saltwater crystal grew amazingly it became larger and more solid.

Sadly, the tap water crystal fell off the string and we predict disintegrated into the other little crystals at the bottom but luckily a few of those crystals are large enough to become a seed.

Something that is sad and disappointing is that we decided to pour the alum solution down the drain, we then found out we were not supposed to do that. We also did not have any more alum, but we did have some borax. From our earlier knowledge, borax can grow crystals, so we decided instead of adding 3 tablespoons of alum we are going to add 3 tablespoons of borax with the boiling water, boiling salt water or soda water.

Week 5

The borax did not work. The borax disintegrated the alum crystal and that led us to have to start over all again but only doing the boiling water. Our teacher had bought us some more alum and we then proceeded following instructions, "crystal growing advice to students." The instructions told us to have 200ml of boiling water and 30g of alum which we did and dissolved them together. We also made a few changes in the way we set up; we filtered the boiling water once we had dissolved the alum, left a coffee filter on top of the water and we moved it into a new space which provided minimal sunlight, temperature changes and no cool drafts. We did not expect there to be so many obstacles, but we think now we can push through it.

Week 5- next day

We came to the science room the next day to find and pick our seed. We followed the instruction precisely and picked out a seed. We left it in the alum solution in the same place we had left it before. The level of the water was around 180mL.



Week 6

When we came to the science room, we found the crystal had grown larger. We also found a few smaller crystals, so we just removed them from the beaker with tweezers.

Surprisingly, the water level changed, we do not know how but the water level now it around 170mL, perhaps some of the water evaporated or the crystals absorbed it. One week the water levels differentiated by 10mL. With the extra little seeds/crystals we picked out, we saved them and placed them into a container because if our main/large crystal breaks we have those spare crystal to use as seeds.

Week 7

We came back and saw that there was some more little crystals that had grown so we removed them. We then saw that the crystals had not grown that much so we read the instructions and read that if you want more growth you could add some more alum which we did, and we then rested it in some hot water. The water levels had dropped to 150mL, so there is 20mL decrease in the water level.



Week 8

We have come back from the holidays to find our crystal has grown!!! We also found a lot of other little "seeds" that have grown. We assume they have grown because of the additional alum we added the other week. Our crystal has grown a lot of other little crystals on it, but we do not want to break those off because we are afraid that it might break the whole crystal. We have decided to leave it and let it be because touching it and moving it around might damage it or change the growth of it. We have also decided to use one of the little "seeds" to grow as our main crystal because it might turn out just as good as the one, we are growing or if not better.



Our Crystal

Week 9

So, you know how we decided to add a "seed" to see how it turns out well, I turned out AMAZING!!!! This seed has grown perfectly and looks incredible. It is better than the original crystal we were growing so we have decided this will be the crystal that we submit and the crystal you are going to judge. The other crystal has hardly grown and has lots of other crystals.



Our (new) crystal

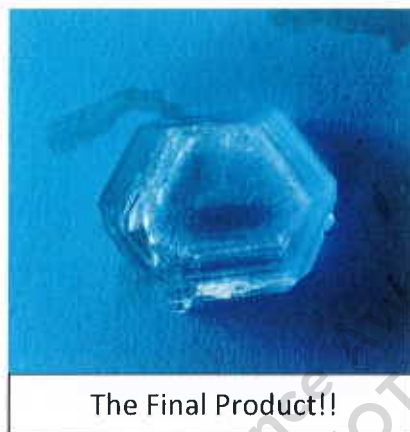
Week 10- conclusion

At the very beginning we asked a question, what happens when we grow crystals using diverse types of water- soda water tap water and saltwater? Now we have an answer, soda water crystals do not work because the water does not dissolve the alum. Saltwater crystals may work but us as a team will not know because the borax will dissolve the crystal. Normal tap water crystals work and form a beautiful solute which is 5mm high, 28 mm long and 20 mm deep. We feel this whole experiment could have been improved if we follow specific instruction instead of growing them with no set steps. We have figured out the steps to grow an Aluminum crystal, they are this:

1. Fill a beaker to 200ml with boiling water from a tap.
2. Then add 30g of prostate aluminum Sulphate.
3. Dissolve the alum until it has disappeared.
4. Filter that water into another beaker using a coffee filter
5. Leave it for a day, with a coffee filter on top of the beaker so no dust or bugs goes into the solution. Make sure to leave it in a place that has minimal sunlight and does not get cool drafts or the temperature changes a lot.
6. After a day has gone then pour the solution into another beaker

7. Then pick the largest seed out of the seeds and place that into the middle of the beaker with the solution.
8. Now all you must do is wait and if you want the crystals to grow bigger place the beaker with the crystal and the solution in a bowl with boiling water to heat up the solution.
9. Now you are done!!

This experience has been incredible, we have learnt and improved so many skills like collaboration, knowledge about solutions and chemicals, how things form and persistence.



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