**Experiment 2**

**VIDEO LINKS**

https://www.youtube.com/embed/q144iV0Kl-I

**Lab experiments (Write protocols and perform experiments based on these):**

1. [Making Saturated Alum Solution](https://youtu.be/TAmY8zMKU_Y)
2. [Growing Seed Crystals](https://youtu.be/qP9pasiLnsM)
3. [Seed Crystal Maintenance](https://youtu.be/u907JehP2p8)

**Demonstration (Watch optional video for additional information on crystal growth)**

1. [Other crystal growing demonstrations](https://youtu.be/j-MqPHbLotE)

**Data analysis and interpretation (Use these if you need help with your data and discussion)**

1. [Solubility](https://youtu.be/UALzuFMjAxE)
2. [Crystallization](https://youtu.be/3LLPN-f19lc)

**The prelab must include Experimental Protocol, Chemical Table and Equipment Table.**

**The lab report requires all sections (including prelab sections) to be completed in one document.**

**Experimental Protocol**

(Analysis) Watch the experiment videos.  Take notes on the protocol.  Stop the video and re-watch as necessary to acquire the details of the procedure.  Write out the protocol for each part of the experiment.  (It can be written in sequential steps.  Complete sentences are not necessary.)  This is the protocol you will follow, so be detailed.

* (Interpretation) Identify the changes that were observed in this experiment. Classify the changes as physical or chemical.
* (Representation) Create a table that includes at least the following information from you and your team members. You may include additional information (ex. your room temperature, cover on/off, etc.) that you think is relevant.

**Chemical Table**

*No chemical data available.*

**Equipment Table**

*No equipment data available.*

**Data Collection**

(Acquiring competencies) Following your detailed protocol based on the videos, perform all the experiments. Record your observations and take pictures of your key steps in the process.  Your observations and images need to be incorporated in your data section and this section should be as detailed as possible as you will use this information to complete your discussion.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Student Name | Volume of hot water (mL) | Temperature of hot water(°C) | Mass of alum (g) | Time until first crystal appeared | Number of crystals | Shape of crystals |
| Yes | Add | 00 | 0.6 | -0.23 | 88 | 67 |

**Data Processing**

1. (Interpretation) Identify the changes that were observed in this experiment. Classify the changes as physical or chemical.
2. (Representation) Create a table that includes at least the following information from you and your team members. You may include additional information (ex. your room temperature, cover on/off, etc.) that you think is relevant.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Student Name | Volume of hot water (mL) | Temperature of hot water(°C) | Mass of alum (g) | Time until first crystal appeared | Number of crystals | Shape of crystals |
| 1 | 12 | 124 | 13 | 41 | 55 | PP |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

1. (Interpretation) Identify at least one aspect that all the experiments were similar in, and one aspect that the experiments differed in.
2. (Assumptions and Analysis) Fill in the following table using the observations and data from your experiments.

|  |  |  |
| --- | --- | --- |
| Assumptions made | Testing the assumption | If assumptions are wrong ... |
| All solids dissolve in water. | Dissolve multiple solids in water. | Some will dissolve and some will not. |
| The distilled water is pure. | Evaporate it and check for residue. |  |
|  |  |  |
|  |  |  |

**Discussion**

Write a minimum one-page (12 font, single spaced) discussion on the experiment conducted this week. Address **at least one question in each category** as fully as possible integrating the collected data, providing explanations for the observed trends and evaluating whether your original assumptions about the experiment were validated by the results. **The assignment will be graded on completeness, clarity of the explanations and the meaningful integration of the collected and calculated data.** Correct grammar and appropriate format for the chemical formulae and chemical reactions is expected. **You may use the outline included at the end of this document on how to build your essay to address each category.**

1. (Existing knowledge, research and views) Describe the contents of a solution and indicate the purpose for each.
2. (Existing knowledge, research and views) Describe at least one methods that you could use to determine if a substance is soluble in water.
3. (Existing knowledge, research, and views) Describe the difference between saturated and unsaturated solutions.
4. (Analysis) Consider the steps involved in preparing the saturated alum solution. Classify the solution as saturated or unsaturated in each step and explain your choice.
5. (Analysis) Provide at least one reason for using hot water to dissolve the alum.
6. (Analysis) Provide at least one supported argument for waiting for the solution to cool to room temperature before filtration.
7. (Lab skill) Describe the filtration process in as much detail as you deem necessary. Provide an explanation for the necessity of each step involved.
8. (Existing knowledge, research and views) Solids can be crystalline or amorphous. Describe at least 3 characteristics of crystalline solids.
9. (Analysis) Describe what happens with the saturated alum solution that causes the appearance and growth of the seed crystals.
10. (Lab skill) Describe the process of monitoring and maintaining the seed crystal.
11. (Analysis) Predict what would happen, if you left all your little crystals in the Petri dish instead of transferring a few into the saturated alum solution, and provide a supported argument for your prediction.
12. (Lab skill) Describe what kind of crystals you would select to start your seed crystal growth and what method you would use to transfer the selected crystal from one dish to another.
13. (Experiment design) Using your experience growing the alum seed crystals, propose a protocol for growing crystals from other compounds, such as copper(II) sulfate, sucrose, sodium chloride, etc. Pick one compound to develop your protocol for.
14. (Existing knowledge, research and views) Growing crystals is visually impressive and useful. Describe at least one application for growing crystals.

**Recommended Discussion Outline**

No content available.