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# Effect of Temperature on Chemical Weathering

**Purpose**

Water is the most important agent of chemical weathering. One way water promotes chemical weathering is by reacting with the minerals in rocks. The purpose of this lab is to examine the effect of temperature on chemical weathering by measuring the rate at which antacid tablets dissolve in water at different temperatures. These tablets contain calcium carbonate, the mineral found in rocks such as limestone and marble.[[1]](#endnote-2)

**Procedure**

**Materials**

1. 250-ml beaker
2. Thermometer
3. Hot water
4. Ice
5. 5 antacid tablets
6. Stopwatch
7. Graph paper

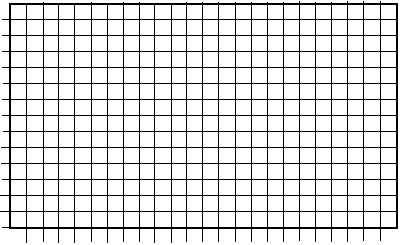
**Sequence of Steps**

1. C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmfAdd a mixture of hot water and ice to the beaker.
2. Use the thermometer to measure the temperature of the mixture and record.
3. Add either more hot water or more ice until the temperature is between 0 degrees C and 10 degrees C. The total volume of the mixture should be about 200mL.
4. C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmfWhen the temperature is within the correct range, remove any remaining ice from the beaker.
5. Record the starting temperature of the water in your data table.
6. Remove the thermometer from the beaker.
7. Start the stopwatch as soon as the tablet enters the water.
8. Drop an antacid tablet into the beaker.
9. C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmfStop the stopwatch when the tablet has completely dissolved and no traces of the tablet are visible. (Don’t wait for the bubbling to stop.)
10. Record the time in your data table.
11. C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmfPlace the thermometer in the beaker and wait for the temperature of the water to stabilize.
12. Record the final temperature of the water in your data table.
13. C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmfC:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmfCalculate the average temperature by adding the starting and final temperatures and dividing by 2.
14. Record the result in your data table.
15. Repeat Steps 2 through 6 four more times, once at each of the following temperature ranges: 10-20 degrees C, 20-30 degrees C, 30-40 degrees C, and 40-50 degrees C.
16. Adjust the relative amounts of hot water and ice to produce the correct water temperatures. The total volume of water and ice should always by about 200mL.
17. C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmfOn the graph, plot your data.
18. Draw a smooth curve through the data points.

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**Data:**

|  |  |  |  |
| --- | --- | --- | --- |
| *Starting Temperature (C)* | *Dissolving Time* | *Final Temperature (C)* | *Average Temperature (C)* |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Results:**

Average Temperature

Dissolving Time

**Conclusion:**

1. At which temperature did the antacid tablet dissolve most rapidly?
2. At which temperature did the antacid tablet dissolve most slowly?
3. What is the relationship between temperature and the rate at which antacid tablets react with water?
4. Would a limestone building weather more rapidly in Homer, Alaska, or in Honolulu, HI? (Both cities receive about the same amount of precipitation in an average.) Explain your reasoning.

**Additional Resources:**

* + <http://geography.sierra.cc.ca.us/Booth/Physical/chp15_gradation/denudation.htm>
  + <http://library.thinkquest.org/20035/chemical.htm>
  + <http://wardsci.com> WARDS’s Natural Science

1. Rangel, Maria (2008). Effect of Temperature on Chemical Weathering. *Holtville High School Agriculture Department.* [↑](#endnote-ref-2)