

Magnesium ribbon and hydrochloric acid



**ASSIGN
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Group members:

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Chosen factors:

magnesium (Mg) is known as a chemical element with the atomic number of 12.

Hydrochloric acid (HCL) is a strong, colorless mineral acid used with many purposes.

Chosen experiment:

The task is to alter and record the different temperatures when magnesium ribbon is placed in hydrochloric acid.

Research questions:

- How will the magnesium ribbon react to the hydrochloric acid?
- How quickly will the magnesium ribbon react to the hydrochloric acid at different temperatures?
- Will it be a slower reaction with the ice bath?
- Will it have a quicker reaction with a higher temperature?

Background research:

Magnesium (Mg) is known as a chemical element with the atomic number of 12. The silvery white solid is an abundant element found in the earth's crust which was first discovered in 1755. Today magnesium has many uses for example photography, fireworks, bombs and flares. Magnesium isn't just

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used for entertainment it is also a key nutrient for health. Due to the human body it is important to a normal bone structure, magnesium is essential to disease prevention, low magnesium levels have been linked to some diseases such as osteoporosis, high blood pressure, diabetes, stroke, clogged arteries and heart disease.

Hydrochloric acid (HCL) is a strong, colorless mineral acid used with many purposes. This substance is produced in the stomach of the human it has the job to break down proteins. It is located and used in many ways for example it is contain in toilet cleaners and used for clean the toilet.

Temperature is a measure of the warmth or coldness of an object or substance with reference to some standard value. The temperature of two systems is the same when the systems are in thermal equilibrium. (“Temperature.” *Dictionary. com* . Dictionary. com, n. d. Web. 12 Feb. 2017.) Temperature can have many chemical reactions on experiments or natural substances. Different temperatures can either increase or decrease the speed of the particles in liquids or gases, causing particles to collect more energy, and to collide and creating chemical reactions when temperature is increased.

Aim:

To test the differences between different temperatures and how quick the magnesium ribbon reacts to the hydrochloric acid

hypothesis:

the higher the temperature the quicker or bigger the chemical reaction is when a magnesium ribbon is drop in the beaker of 25ml of hydrochloric acid. Also when the experiment is set in the ice bath, the reaction time will be much slower than the other temperature sets.

equipment/materials:

- 5 x 80ml beaker
- Hydrochloric acid 15x 25ml = 375ml
- 15 x magnesium ribbon
- 3x ice (ice bath)
- 3x ice cream container
- 3x heat pad
- 1x thermometer
- 3x heat mat

Method:

Before anything was started, the whole method was reread and memorised so there was an understanding of the experiment. Next the correct PPE was equipped so if there was an error there was some protection, the equipment that was essential to equip was

- Closed in shoes
- Apron
- Safety goggles/classes
- Gloves
- Hair net

Once the PPE was suited up, all the equipment was checked to make sure there was nothing missing, so the experiment didn't need to be paused just to get more equipment.

The experiment was started by first unpacking the equipment and to prepare the hydrochloric acid by putting 25 ml in each beaker, then setting up the heat plate to the right setting to heat the hydrochloric acid to 80 C. once the heat plate hit its aiming temperature the beaker was placed on it till it hit the temperature of 80 C when it hit 80 C exactly, a piece of magnesium was placed in the beaker with the chemical reaction being recorded by both a timer and writing down what happened.

The same steps happened with the other temperatures, which were 60 C, 40 C, the room temperature (22 C) and the ice bath (6 C).

Results:

temperature	1 st test	2 nd test	3 rd test	observations
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Ice bath = 6 C	5: 03:	5: 10: 31	5: 12: 24	
		57: 31		-> 8 C
				C -> 8 C

Room temp 22 C	1: 19:	1: 25: 62	1: 27: 78	Temperature
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32 increases
 C -> 27 -> 26 with
 28 C C magnesi
 C m

0.1
 48: molec 0.1
 85 ule molec
 sec ule Wasn't
 40 C 4: 45: rapid just
 -> 31 3: 19: frizzing
 43 69
 C -> 46
 C 60 C
 C

45:
 28 49: 03 41: 44
 60 C bubbling
 75 76 C 71 C
 C

47:
 81 48: 65 49: 57
 80 C Bubbling
 82 87 C 90 C
 C

Discussion:

During this experiment it was just expected in the hypothesis as the temperature went lower the slower the reaction time, that was also the only pattern noticed in the experiment.

The experiment was very successful besides at one point in the experiment were the hydrochloric acid strengths were mixed up instead of using 1 molecule we use 0.1 molecule for at least 2 tests.

Evaluation:

during the experiment, there was only one error which was the molecule strength was mixed up, instead of using the 1 molecule on 2 of the 40 tests we use 0.1 molecule this could have been avoided if we paid more attention to the equipment we used in the test.

Conclusion:

this EEI (extended experimental investigation) has discussed the aim of the experiment, the method and the results of the experiment, also the errors of the investigation that will be made sure that the same errors will not be made in future experiments. The main substances that were used in the experiment were hydrochloric acid (HCL) and magnesium ribbon(Mg) when these materials combined there was a chemical reaction, the reaction was that there was bubbling and fizzing when the magnesium dissolved, there was a pattern when the temperatures changed, the molecules in the acid would change speed cause the reaction to be either fast or slow, when the acid was at a high temperature for example 80 C the molecules in the acid were packed together but free to move but they were moving at a high

speed but not as fast as gas molecules, this was causing the acid to bubble like boiling water, as the temperature was high this made the magnesium ribbon to dissolve faster. A real-world version of this experiment could be when cooking steak on a barbeque where the higher the temperature the faster the meat will cook.