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10s

Mr Johns

Investigating dissolving

Introduction

I have been asked to perform an investigation on the length of time it takes for a certain amount of sugar to dissolve in a certain amount of water at different temperatures. I will investigate whether the time taken at one temperature and another will be the same, quicker or slower using scientific methods.

Identifying Key Factors

The factors that would affect the dissolving rate are:

- Volume of water
The larger the volume of water, the quicker the sugar will dissolve because there is more particles for the sugar molecules to collide with

- Mass of sugar
The more sugar there is the dissolving rate will be slower

- Size of sugar particles
The bigger they are the slower they will dissolve
- Temperature
the higher the temperature the quicker the sugar will dissolve

I will keep all these factors constant except temperature. I am going to choose a range of temperatures for the 100cm³ of water and investigate the speed at which 10g of sugar will dissolve

Prediction

I predict that in my experiment when the temperature is raised the quicker the sugar will dissolve. This is because when the temperature is increased the water gains heat energy, and the particles gain this heat energy, which they convert in to kinetic energy, causing them to move much faster. This mean that there is a higher chance of collision because the sugar and the water particles move towards each other much faster, allowing a head-on collision. This collision is when the water breaks down the sugar and dissolves it.

Apparatus

- Tripod
- Stopwatch
- Bunsen burner
- Thermometer

- Glass beaker
- Stirring rod
- Heat proof mat
- For safety: Goggles

Method

□ Collect all apparatus and set up as shown below:

- Choose your temperatures (I choose 30°C, 40°C, 50°C, 60°C, 70°C, 80°C)
- Measure 10g of sugar and 100cm³ of 20°C water
- Pour water and sugar into the glass beaker, start the stop-clock and begin stirring
- Constantly stir until the sugar dissolves and then stop the clock and record the time in a results table
- Repeat the experiment again using the same temperature to ensure a more accurate result
- Repeat experiment using different temperatures (Put goggles on before lighting gas to heat the water)
- Create an average time for all temperatures and then plot a graph to show results

Results table

TEMPERATURE (°C)	TIME TAKEN 1 ST ATTEMPT (SECONDS)	TO DISSOLVE 2 ND ATTEMPT (SECONDS)	AVERAGE (SECONDS)
30	45	47	46
40	35.5	36	36
50	31	31	31
60	24	25	24
70	22	23	22
80	20	20	20

Conclusion

As I expected, when the temperature was raised the quicker the sugar dissolved. For example at 30°C the sugar was fully dissolved at 46 seconds, but as the temperature rose to 50°C the time taken for the sugar to fully dissolve was a much shorter 31 seconds and again as the temperature rose to 80°C time taken was shortened once again at 20 seconds. This is because when I increased the temperature the water and sugar molecules gained more energy, which they then converted into kinetic energy. The particles moved much faster and there was a higher

chance of head on collision so therefore the time taken for the sugar to dissolve decreased when I increased the temperature.

Evaluation

My experiment went as planned. The temperatures and quantities that I chose to use worked very well in the experiment. Although I took care in keeping all factors the same for a fair test and I repeated the experiment and worked on the averages of my findings I still found 2 anomalous results when I plotted my graph. I think this is because of my rate of stirring could not be kept constant. To improve the experiment I would only stir 10 times instead of stirring constantly throughout the dissolving process. And I also think to improve the experiment further I should repeat my readings another time and figure out the average with my third findings. These improvements will give a more accurate result. A way to extend this experiment is to test how long the sugar would dissolve if it had a larger mass. I think this experiment was carried out with great care and instructions were followed to the best of my ability.