Chemistry Coursework Experiment Thomas Temple 10i

An experiment to find the strength of five Household Acids And Alkalis.

Introduction:

In this experiment I hope to find out the strength of three household alkalines and two household acids.

Prediction

I plan to do this by using the theory of neutralisation. Neutralisation is when an Alkalae neutralises an Acid or vice-versa. Neutralisation happens when Hydrogen Ions from the acid react with the Hydroxide Ions from the Alkalae to form Water.

$$H_{(aq)} + OH_{(aq)} \rightarrow H_2O_{(l)}$$

Acid + Alkalae → Water (Neutral)

The reason that this reaction works is that Acids give away Hydrogen Ions where as Alkalaes take them, and without this, neutralisation couldn't happen. So the Alkalae takes the Hydrogen Ions From the Acid so the Alkalae now has two Hydrogen Ions joined to one Oxygen Ion, which is left over from the Alkalae and this is called Water (H_2O) which is neutral (Ph7).

In this experiment I shall be using alkalines to neutralise the Acid and acids to neutralise alkalines. Bases are chemical opposites of Acids and they are often called Antacids (against Acids). They can neutralise Acids as I have explained above by the theory of neutralisation. This ability to neutralise Acids is extremely useful. Bases are used in many household agents from indegestion medicine to oven cleaner. They are used in things

like oven cleaner because they can dissolve grease and dirt and they are used in things like toilet cleaner because they kill germs and bacteria. All of the 5 household agents that I will be using in this experiment are , toilet duck , bathroom cleaner , kitchen cleaner , carpet cleaner and window cleaner.

Despite their usefulness Acids and Alkalis are, potentially very dangerous and this brings me to the point of this experiment. All of the Acids and Alkalis used in household agents are quite strong, obviously some are stronger than others. So they are obviously very dangerous, especially if swallowed or spilt in eyes. In this experiment I hope to find out how strong the acids and alkalis are by trying to neutralise them with either Acids or Alkalines .

To find out which are the strongest agents I am going to conduct a simple experiment using my knowledge of neutralisation. I plan to test the strength of the 2 Acids and three Alkaklines by adding to them a certain volume of Acid and Alkali to see how much Acid or Alkali is needed to neutralise them. Therefore the more Acid or Alkali that is needed to neutralise the Agent the stronger it is. As I have learned during many experiments, carrying out the experiment more than once is imperitive to keep your results accurate ,and therefore I am going to carry out this experiment three times for each of the household agents.

From my general knowledge I can hypothesise which of the Agents are going to be stronger and which are going to be weaker. I predict that kitchen cleaner is going to be the strongest because it is a Kitchen cleaner and therefore it needs to remove tough stains and marks in the kitchen and, for this it will need to be strong. The second strongest, I think will be Carpet Cleaner because in order to clean stains out of carpets it will need to dissolve stains. Next strongest I think will be toilet duck because in the toilet there is lots of germs and bacteria so the toilet will need quite a strong cleaner. Then next strongest I think will be Window Cleaner because there are a lot of stains and marks on the window , but it cant be to strong otherwise it will mark the window that can breed on kitchen surfaces which will require a semi-powerful cleaner, and finally I think that the weakest will be Bathroom cleaner because Bathroom Cleaner would only have to shift small bits of dirt. Although I think Kitchen Cleaner will be strongest I also think that it will only just be stronger than Carpet cleaner and I think that it could be a close contest between Kitchen and Carpet Cleaner.

Safety:

- Wear goggles at all times.
- Always wash off any Acid or Alkalae spilt on your skin
- Bags and coats under desks
- Long hair tied back

Apparatus:

1 10ml Measuring Cylinder, 1 Pipette, 1 100ml Conical Flask, 1 White Tile, 1 Bottle of Acid (1M) and 1 bottle of each five household Agents (window cleaner , Carpet Cleaner , Toilet Duck , Bathroom Cleaner and Kitchen cleaner

Diagram:

Method:

1. Collect all of the apparatus.
2. Measure out 5ml/cm3 of the Base and pour it into the Conical Flask.
3. Add 8 drops of Universal Indicater to the Base. We use Universal Indicator because it has the widest range of colour of colour change and therefore it is the accurate of all the Indicaters.
4. Measure out 10ml/cm3 of Acid or alkaline (1m).
5. As slowly as possible pour in the Acid or Alkaline, swirling the solution around after every pour to help the colour change.
6. Do this until you notice that the Universal Indicator has turned green (neutral).

NOTE: You might have to use more than 10ml/cm3 of the Acid or Alkaline depending on the strength of the Agent.

7. When the Universal Indicator has turned green stop pouring and look at the measuring cylinder to see how much Acid or Alkaline you have added.
8. Record the amount that you needed to add to neutralise the Agent.
9. Repeat this experiment a minimum of three times for each of the Agents.

Fair Test:

1. Always keep the volume of Agent the same (5ml/cm3).
2. Always use the same amount of Universal Indicater (8 drops).
3. Always use the same type of Acid or Akaline (Nitric Acid 1m)
4. Always keep the temperature the same (Room Temperature)

Results:

Household Agent	Test 1 Amount of Acid/ Alkaline used	Test 2 Amount of Acid/ Alkaline used	Test 3 Amount of Acid/ Alkaline used	Average
Window Cleaner	1.5 cm 3	2 cm 3	1.8 cm 3	1.76 cm 3
Carpet Cleaner	5 cm 3	5 cm 3	4 cm 3	4.66 cm3
Toilet Duck	6.5 cm3	6.5 cm 3	8.5 cm 3	6.5 cm 3
Bathroom Cleaner	5 cm 3	5 cm 3	5 cm 3	5 cm 3
Kitchen Cleaner	5.5 cm 3	5.0 cm 3	6.0 cm 3	5.5 cm 3

Conclusion:

From this experiment I found out that different agents have different strengths and from looking at my results I can put the five household Agents that I used in this experiment into rank order:

(Strongest)	1. Toilet duck
	2. Kitchen Cleaner
	3. Bathroom Cleaner
	4. Carpet Cleaner
(Weakest)	5. Window Cleaner

This rank order shows that Toilet Duck is the strongest and Window Cleaner is the weakest. From this rank order I can also say that my hypothesis was wrong. I was right in saying that Kitchen Cleaner and was going to be one of the strongest but I was wrong in saying that Kitchen cleaner would be the strongest because Toilet Duck is. I was also wrong in saying that it would be a close contest between both Carpet and Kitchen Cleaner ,but my prediction of their rank order was totally incorrect.

From my results I can tell which are the most dangerous Agents by their strength, the strongest Agents being the most dangerous. However even though I have said that the strongest Agents are the most dangerous all of the Bases that I used in this experiment need to be handled with care because they can all cause harm if misused. I cannot however say accuratly which out of all household Agents is the strongest because I have not tested all of them.

By doing this experiment I have also proved that the theory of neutralisation works.

Evaluation:

Overall I was very pleased with the outcome of this experiment. Throughout the experiment I followed the Fair Test and this obviously made the results of this experiment more accurate. If I could do this experiment again to improve it I would: repeat the experiment more than three times, I would do the hole experiment again using different types of Acids and alkalines with perhaps different strengths and I would like to go on to test the strength of other household Alkalisand Acids) Learn more about the theory of neutralisation and the process and to increase the accuracy of my current results. Another thing that I noticed when doing this experiment was that the reaction between alkalines and Acids was exothermic so in the future I would like to explore this in more detail by measuring the temperature of the solution throughout the reaction to try and gain a better understanding of neutralisation. In this experiment I also had no odd results so this means that the experiment was quite accurate.