Curiosity Guide #605
Acids and Bases

Accompanies Curious Crew, Season 6, Episode 5 (#605)

Secret Messages

Investigation #1

Description

Astound your friends by making a message appear like magic!

Materials

- Ammonia. Adult supervision is required.
- Water
- Small spray bottle
- Tub
- Spoon
- Cotton balls
- Wax candle
- Goldenrod paper
- Paper towels
- Goggles
- An adult to supervise
- A friend

Procedure

1) Before the experiment, use the candle like a pencil and write a message on one piece of the Goldenrod paper.
2) Put on safety goggles.
3) Fill half the spray bottle with ammonia and the rest with water.
4) Screw on the cap and gently shake the spray bottle.
5) Fill the small tub half full of ammonia and the rest with water.

6) Stir the ammonia and water well with a spoon.
7) Show the Goldenrod paper with the message to a friend.
8) Have the friend observe while spraying the paper with the ammonia/water mixture.
9) Use a cotton ball to spread the liquid over the paper surface.
10) What do you notice?
11) Place your hand in the tub. Then place your hand on the second piece of Goldenrod paper.
12) What do you notice?
13) What happens over time?

Extend the learning by trying other bases and acids. You could try sodium carbonate as the base and lemon juice or vinegar as the acid.

My Results

Explanation

Please note: Ammonia should only be used in well ventilated areas with adult supervision and should not be mixed with other chemicals.

Goldenrod paper is a special indicator paper that turns color in the presence of a base. The ammonia, which is a base, reacts with the dye in the paper and turns red.

After some time, the paper turns back close to its original yellow color. This is because the carbon dioxide reacts with water vapor in the air and makes carbonic acid, a weak acid that has almost a pH of 7. The carbonic acid neutralizes the ammonia and makes ammonium carbonate.

Extend the learning. If you substitute ammonia with a stronger base like sodium carbonate, you will need a stronger acid to change the color back. In this example, lemon juice or vinegar would be strong enough acids to neutralize the base.

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