

Disappearing and appearing colours: iodine experiments

Description

Students using cotton tips to 'write' with an iodine solution on filter paper. With another cotton tip they 'erase' the writing with ascorbic acid. In another activity, they visualise their fingerprint on a piece of paper stored in a closed glass jar with solid iodine.



Curriculum topics

- Chemical change
- Redox reactions
- Chemical reactions
- Chemical bonding
- Changes of state

Materials

For one group of students

- Iodine solution (povidone iodine or betadine, available from pharmacies)
- Ascorbic acid solution (5 g in 100 mL water)
- 2 x 100 mL beakers
- Filter paper (any size)
- Paper towel
- Strips of paper (wide enough for a finger print, tall enough to stand in glass jar)
- Tweezers
- Cotton tips
- Iodine, solid (1-2 grams)
- Screw top jar (can use an old jam jar)

Safety

This experiment should be completed in a laboratory to avoid staining desks with the brown iodine solution. Students should wear gloves to keep from staining their hands.





Solid iodine

Warning – Toxic. Highly lung-irritant vapour evolved from the solid. May cause an allergic reaction on skin. Harmful in contact with skin. Very toxic to aquatic life

Iodine solution

Harmful if swallowed, in contact with skin, can cause skin irritation.

Waste – All solutions can be washed down the sink. The filter paper can be disposed of in the normal rubbish.

Procedure

Disappearing writing

1. In two 100ml beakers, pour in a little amount of iodine solution in one, and a little amount of dilute solution of ascorbic acid in the other.
2. Place a piece of filter paper on top of a piece of paper towel.
3. Dip the tip of a cotton bud into the iodine solution, and write or draw a message onto the paper.
4. Using a second cotton bud, dip into a dilute solution of ascorbic acid, and draw over the top of your writing. Observe what happens.

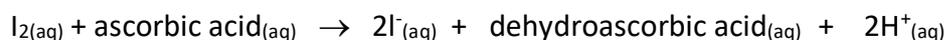
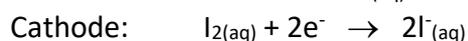
Fingerprinting

1. Press your thumb print onto a strip of paper (you might want to rub your fingers through your hair first to get them a bit oily).
2. Place the paper strip into a bottle that contains ½ teaspoonful of solid iodine. Close the lid.
3. Leave it to rest for approximately one minute.
4. Remove the paper strip from the bottle using tweezers and look at it carefully.

Teaching notes

Brown coloured iodine is reduced by ascorbic acid, resulting in a colourless compound.

The chemical equations for the reaction are:



At room temperature, iodine sublimes, as some iodine moves between its solid phase directly to the gas phase. When your finger is pressed down onto the paper, oils from the



skin are transferred to the paper. These oils then react with the iodine vapor, producing a brown color that traces the fingerprint.

References

This activity was modified from

- An activity used by the National Indigenous Science Education Program (NISEP). The NISEP team, led by Associate Professor Joanne Jamie (Macquarie University) were awarded the Department of Industry, Innovation and Science Eureka Prize for STEM Inclusion in 2019
- Lasselle University, USA - <http://www1.lasalle.edu/~prushan/Experiment8-redox%20titration.pdf>

