

DISAPPEARING INK

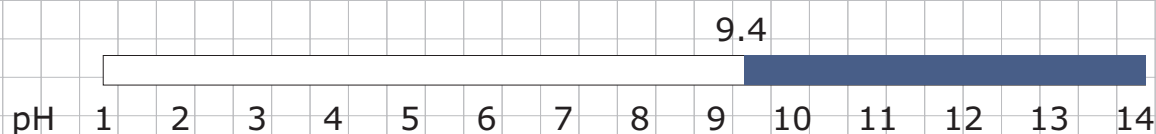
Disappearing ink is a valuable acid-base educational tool in the classroom.

DISAPPEARING INK'S CHEMISTRY

The ink basically has 3 ingredients:

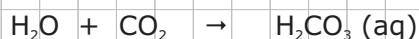
- ▶ Alcohol (denatured ethanol)
- ▶ Sodium hydroxide (caustic soda)
- ▶ Thymolphthalein indicator

Thymolphthalein is an acid-base indicator and its colour changes from clear to blue at a pH of 9.4:

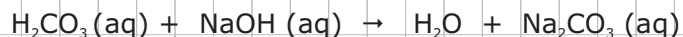


The ink is made-up with NaOH (sodium hydroxide) a strong base to keep the pH value above 10.

We all exhale carbon dioxide (CO₂). This reacts with water in the atmosphere and forms carbonic acid (H₂CO₃) a weak and unstable acid:



When the ink is squirted, the dilute sodium hydroxide in the ink is neutralised by carbonic acid, a product from our mouths!



This simple neutralisation reaction lowers the pH of the ink to below 9.4 and the thymolphthalein loses its colour.

Some interesting points:

- ▶ The ink's end product on clothes are safe as sodium hydroxide is turned to washing soda (Na₂CO₃).
- ▶ Determine if the above reasoning is indeed true by timing the disappearing blot with and without students in the class.
- ▶ The disappearing tempo is accelerated by breathing directly onto the blot.
- ▶ If dry ice is available, the blot can be magically "wiped" with dry ice (wear gloves).
- ▶ Now for the magic part: Make the blot re-appear on your lab coat by simply spraying a dilute ammonia household cleaning solution on the lab coat. Any other base will do this too.

Have fun!

