Disappearing ink

Topic
Acids and bases.

Timing
30 min.

Description
Students produce a solution in which the colour disappears due to an acid/base reaction.

Apparatus and equipment (per group)
- 100 cm³ Beaker
- 10 cm³ Measuring cylinder
- Small paint brush to test the ink.

Chemicals (per group)
- Ethanol (Highly flammable)
- Sodium hydroxide 0.4 mol dm⁻³ (Irritant)
- Thymolphthalein solution (50 per cent water, 50 per cent ethanol) (flammable)

Teaching tips
This ink is the same as those sold in trick and joke shops. The amount of indicator can be adjusted to give a deep blue colour. The compound produced, Na₂CO₃, is commonly called washing soda.

Background theory
Sodium hydroxide reacts with carbon dioxide in the air to form sodium carbonate.

\[ 2\text{NaOH}(aq) + \text{CO}_2(g) \rightarrow \text{Na}_2\text{CO}_3(aq) + \text{H}_2\text{O}(l) \]

Sodium carbonate is less basic than sodium hydroxide and causes the indicator to change from blue to colourless. The colourless range for thymolphthalein is below pH 9.3. The blue range is above pH 10.5 and the colour change takes place between these two. The alcohol evaporates and leaves a clear and colourless residue.

Safety
Wear eye protection.

Answers
1. Carbon dioxide.
2. Sodium hydroxide + carbon dioxide → sodium carbonate + water
3. \(2\text{NaOH} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}\)