

# Invisible Ink Experiment

## Introduction

Invisible inks are used to send secret messages. Typically a secret message is hidden within an ordinary letter and can be revealed by the receiver using a known procedure. A secret message has the advantage over a coded message in that people intercepting the mail would have no idea that a message was being sent. However, a plausible cover is needed to hide the secret message (a blank piece of paper would arouse suspicion!)

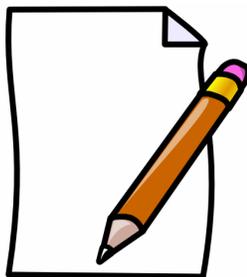
An ideal invisible ink should be easily made, hard to detect and easily and safely revealed. Invisible inks are normally non-greasy and not visible under UV light (a common screening method for post).

Commonly acids and bases are used as invisible inks, and these are subsequently revealed by indicators. Indicators are chemical compounds which are different colours when in contact with either acids or bases.

In addition to indicators, heat can also be used to reveal messages. A substance applied to the paper that burns at a lower temperature than the paper and the message is revealed.

## Practical

1. Squeeze some lemon juice into a container. In a different container dissolve some bicarbonate of soda with some warm water. Stir well – it does not matter if it is not completely dissolved.
2. Use different brushes to apply both the lemon juice and bicarbonate of soda solution to separate pieces of paper. It is important that you allow both to dry thoroughly before you can reveal your messages.
3. Red cabbage contains a natural indicator which can be used to reveal messages. Mash the diced red cabbage and warm water in a pestle and mortar. You should get a dark purple solution. This will be your indicator.
4. Apply your indicator over the top of the messages you originally created using a paintbrush.



## Questions

What is an indicator?

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Is the lemon juice acidic or basic?

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What happens when an acid and a base react together? What is the name of this reaction?

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Write an equation for the reaction of sodium hydroxide with hydrochloric acid:

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Next to each of these everyday items, write down whether they are acidic, neutral or basic:

- Vinegar .....
- Coca Cola .....
- Water .....
- Soap .....
- Lemon .....
- Lime Water .....
- Bleach .....

How could you test whether you were correct about them being acidic, neutral or basic?

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