

## Invisible Ink Experiment

### Introduction

Invisible inks are used to send secret messages. Secret messages are hidden within an ordinary letter, and can be revealed by the receiver. A secret message prevents other people from reading the message, or even knowing it is there. A secret message should be used with a believable normal message in order to hide the secret message (a blank piece of paper would be suspicious!).

Invisible inks can be used as a fun way to communicate secretly with friends. 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 ultra violet light (a common screening method for post).

Commonly acids and bases are used as invisible inks, and these are revealed by indicators. Indicators are chemical compounds which are different colours when in contact with either acids or bases. With acids, indicators generally turn red, and with bases they generally turn a blue/green colour.

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 so the message is revealed.

In this practical you will investigate making up solutions and then using them to create your own secret messages!



## Practical

1. Squeeze some lemon juice into a container.
2. 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.
3. 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 reveal your messages.
4. 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.
5. Apply your indicator over the top of the messages you originally created using a paintbrush.

## Questions

What happened when you applied the indicator to your pictures?

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What is an indicator?

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Is the lemon juice acidic or basic? Is the bicarbonate solution acidic or basic?

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What properties are required for a good invisible ink?

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