

D3: The Non-burning £5 Note

- Preparation time 10 minutes
- Demonstration time 5 minutes

Requirements

| | |
|--|-------------------|
| Bunsen burner | eye protection |
| pair of tongs | fire extinguisher |
| heat proof mat | |
| 3 x 250 cm ³ beakers | |
| paper | |
| bowl of water | |
| £5 note (optional) | |
| 75 cm ³ ethanol (highly flammable) | |
| a few grams of sodium chloride | |

Method

- 1 Prepare some pieces of paper about the size of a £5 note.
- 2 Prepare three beakers: one containing about 50 cm³ water, the second containing 50 cm³ ethanol and the third containing a mixture of 25 cm³ of water mixed with 25 cm³ ethanol with a little sodium chloride dissolved in it.
N.B. For the demonstration, have a bowl of water ready to put burning paper into if necessary.
- 3 Soak a piece of paper in water and try to ignite it by holding it with tongs in a yellow Bunsen flame. It will not ignite.
- 4 Soak a second piece of paper in ethanol and repeat. This will ignite easily - you will only need to hold the paper in the flame very briefly. The alcohol will burn and ignite the paper, which will burn away.
- 5 Soak a third piece of paper in the alcohol-water mixture and hold it briefly in the Bunsen flame. This time the alcohol will ignite and burn away, but the paper will not. Optional: repeat with a £5 note.

Safety advice

Eye protection for teacher **and** pupils must be worn. A fire extinguisher should be readily available, but a heat proof mat or damp cloth is likely to be effective.

Chemical background

The water in the alcohol-water mixture evaporates, which keeps the temperature below the ignition temperature of the paper (approximately 230°C). The paper will still be wet with water after the alcohol has burned away. The alcohol-water flame is almost invisible, but by adding sodium chloride it looks like a normal yellow flame.

Reference

Adapted from a demonstration in *Classic Chemistry Demonstrations*, RSC, 1995.



eye protection
must be worn



**HIGHLY
FLAMMABLE**
ethanol