

Fire writing

You are going to draw using a special 'ink', then set fire to your drawing!
If you do it properly, the paper burns only where you drew on it.

Fire writing makes lots of smelly smoke, so the room needs to be well ventilated.



Job 1 Measure 10 cm³ of distilled water into a beaker.
Add a spatulaful of some sodium nitrate to the water.
Stir carefully with a glass rod to dissolve the sodium nitrate.



If all the sodium nitrate dissolves, add a little bit more and stir to dissolve it.

Repeat until no more will sodium nitrate will dissolve. At this point, you will have made a **saturated solution**.

Job 2 With a small paintbrush, use your saturated solution to write a message on the paper – you can draw a picture instead if you like.



Make sure you use joined-up writing, and don't complete any loops. Otherwise, parts of the paper will fall out as it burns and spoil the result.


Leave the paper to dry completely. The fire writing won't work if the paper is still damp.

Job 3 Light a wooden splint, then gently blow it out so that the end is just glowing. Do not use the splint if it still has a flame.

Touch the glowing end to the start of your message or picture until the treated paper starts to glow and char. You may need to tilt the paper so that the charring continues along your painted line.

Stand back and watch – take care not to breathe in lots of smoke.



The hazard symbol  shows that sodium nitrate is an **oxidising agent**.

Oxidising agents can supply extra oxygen to keep a fire going. The paper with the lines of sodium nitrate burn more easily than the paper on its own, so you get fire writing!

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Teacher Guide



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- Activity notes
- Student checklist
- Technician notes

Activity notes

Fire writing is very easy to do, but you must be careful. It works best on absorbent paper such as sugar paper, and students seem to prefer to draw a message or an image in pencil first.

The sodium nitrate solution should not be used too sparingly; otherwise it can be difficult to sustain the smouldering lines.

The paper must be dry before attempting to ignite it. The fire writing will not work properly if the painted line is still damp. If you can't wait for the paper to dry naturally, use a warm hair dryer to speed up the drying process.

If the fire writing seems to be burning too slowly, it can help if the paper is held almost vertically. However, care must be taken so that it doesn't burn too vigorously – it can burst into flames unexpectedly.

Similarly, care must be taken when disposing of burnt and unburnt paper at the end of the session. Fire writing produces a lot of smelly smoke, so ensure good ventilation in the lab.

sodium nitrate(V)

Solid sodium nitrate(V), NaNO_3 , is oxidising. Sodium nitrate solution is harmful if swallowed, and irritant to the skin, eyes and respiratory system.

Wear eye protection and ensure that the lab is well-ventilated.

Fire writing

Student checklist

Check that you have the following things.

- 1 × 100 cm³ beaker
- 1 × 10 cm³ measuring cylinder
- 1 × spatula
- 1 × glass rod
- 1 × artists' paintbrush
- 1 × pencil
- 1 × heat-resistant mat

You will also need access sodium nitrate, water, wooden splints and a Bunsen burner.



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Technician notes

Per student

- 1 × 100 cm³ beaker
- 1 × 10 cm³ measuring cylinder
- 1 × spatula
- 1 × glass rod
- 1 × artists' paintbrush
- 1 × pencil
- 1 × heat-resistant mat

In the lab

- sugar paper
- wooden splints
- sodium nitrate(V), NaNO₃(s) 
- deionised or distilled water
- Bunsen burner