

Blueprinting

Job 1

The first job is to make your **light-sensitive** solution.

Get your gloves and eye protection on.

Then get two small beakers:

- weigh 5 g of Substance A into one beaker
- weigh 9 g of Substance B into the other.



Use the measuring cylinder to add 50 cm³ of water to each beaker.

Stir carefully with the stirring rod until all the crystals in each beaker have dissolved.



Substance A, the orange-red crystals, is potassium hexacyanoferrate(III). Substance B, the brown crystals, is ammonium iron(III) citrate.

When you mix the two solutions together, you make a mixture that is sensitive to light.

Job 2

The second job is to make your blueprinting paper.

You've got to do this bit in a **dark** part of the lab.

Mix the two solutions (A and B) together, and pour them into a tray.



Take care – the mixture stains skin, clothes and furniture.

Lay a piece of white A4 paper onto the surface of the liquid just long enough to get it damp – not wet! Your paper will turn **greenish-blue**. Hang it up to dry out.



The blueprinting paper must be dry for it to work.

You can use it as soon as it is dry. If you are not going to use it straightaway, store the paper in the dark in a drawer or a box.

Job 3

The last job is to make your blueprints.

You've got to do this bit in a bright, sunny part of the lab.

Carry your dry blueprint paper and object over to the window.

Place your object on top of the paper, and leave it in the sunlight:

- the bits covered by your object will stay green
- the exposed bits will turn blue.

When you think it has gone blue enough, take the object off the paper.

Wash the blueprint paper carefully with tap water. This removes the green colour but leaves the blue colour behind. You will see white where the green has been washed away.

Leave your blueprint to dry out completely.

Blueprinting

Teacher Guide

Contents

- Activity notes
- Student checklist
- Technician notes

Activity notes

Making the blueprint paper

This stage should be done away from direct sunlight, ideally in a semi-dark lab. Two solutions need to be made:

- **substance A**
5 g of potassium hexacyanoferrate(III) dissolved in 50 cm³ of water
- **substance B**
9 g of ammonium iron(III) citrate dissolved in 50 cm³ of water.

The two solutions are named as **A** and **B** just to make the method easier for the students to follow.

The two solutions should be mixed together and poured into a tray. Plain A4-sized paper is then floated on the surface. A wide range of paper types seem to work, but avoid very shiny paper or very coarse paper. It works best if the tray is gently swirled to cover all the underside of the paper, without prodding it with fingers and pens! The paper should then be hung up to dry in a dark part of the lab, and then left flat in a drawer or a lightproof box.

Making a blueprint

When the students are ready, they should arrange their objects or paper cut-outs on the blueprint paper. The paper must be dry – it doesn't work if the paper is damp.

The assembly can then be left in sunlight on a bench to develop. It helps if a sheet of glass is placed onto to keep it all flat. After the blue colour develops, the paper is then washed with clean tap water to remove the undeveloped green colour, and then left to dry. In good light, the blueprint develops within a minute or two to give a sharp image. On dull days, the exposure time needed is much longer, and produces a shadowy effect due to the movement of the sunlight.

potassium hexacyanoferrate(III) ⚠

Irritant to the skin and eyes.

blueprinting mixture ⚠

Stains skin and clothes. Wear protective clothing (e.g. a lab coat), gloves and eye protection. Protect surfaces using old newspapers or similar.

Blueprinting

Student checklist

Check that you have the following things.

- $2 \times 150 \text{ cm}^3$ beakers
 - $1 \times 100 \text{ cm}^3$ measuring cylinder
 - glass rod
 - plastic tray
 - A4 plain paper
 - wash bottle containing distilled water
-

Blueprinting

Student checklist

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Blueprinting

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Blueprinting

Technician notes

Per group of students

2 × 150 cm³ beakers

1 × 100 cm³ measuring cylinder

1 × glass rod

1 × plastic tray

1 × wash bottle containing distilled water

approx. 20 sheets plain A4 paper (or a size appropriate to the tray)

In the lab

digital balance, precise to ±1 g or ±0.1 g

spatulas

potassium hexacyanoferrate(III) – labelled as 'Substance A – Irritant'

ammonium iron(III) citrate – labelled as 'Substance B'

drying line with bulldog clips