

Prussian Blue – Teacher's Instructions



For Demonstration/Class Activity

Make Sure You Have...

Potassium Ferricyanide ($K_3[Fe(CN)_6]$)/Iron(III) Citrate ($NH_3FeC_6H_8O_7$) solution

Spatulas

Hydrochloric acid (HCl, 1 M) solution

Water

Card

Pen

Scissors

Filter Paper

Strong Lamp

Heatproof mat

Tissue

What To Do....

1. Cut a star or moon (or your own idea!) shaped stencil (may have been done in advance)
2. Soak the filter paper in the Potassium Ferricyanide/Iron(III) Citrate Solution
3. Dab the filter paper dry with a tissue

The filter paper should be a yellow colour

4. Put the filter paper on a heatproof mat with the stencil over it.
5. Shine the bright light on the filter paper

The exposed sections of the filter paper should turn blue and the covered sections should stay yellow

6. Soak the filter paper first in the dilute Hydrochloric Acid Solution then in Water.

This “fixes” the blueprint.

7. Wash everything up (solutions can be kept or go down the sink)



What's Happening?

In this experiment you start off with two compounds, both of which contain iron in the (III) oxidation state. When the light is shone on the solution, the citrate ion reduces iron(III) to iron(II). This allows the formation of the iron(II) – CN – iron(III) (Fe(II)-CN-Fe(III)) bridged complex that gives the intensely blue coloured dye “Prussian Blue”.

Before photocopying was invented, copies were made in the same way that you’ve just made you blueprint. The sections of the paper that are not exposed to light remain the original green/yellow colour whereas the exposed sections turn intense blue as Prussian Blue is formed. The Hydrochloric acid washes the un-reacted solution away so that the blueprint is “fixed” and the production of the Prussian Blue pigment is stopped.



Prussian Blue was one of the very First Pigments to be discovered (Picture from Alfred Bader's collection)