Cyanotype: Painting with Sunlight

The science and history behind the blue photographic process

Essential question: How can sunlight turn iron salts into a permanent blue image?

Before Cameras Were Everywhere

Early photography depended on light-sensitive chemistry

Cyanotype was invented in 1842 by John Herschel

Inexpensive, stable, and easy to reproduce

A simple 1840s milestone in photographic history

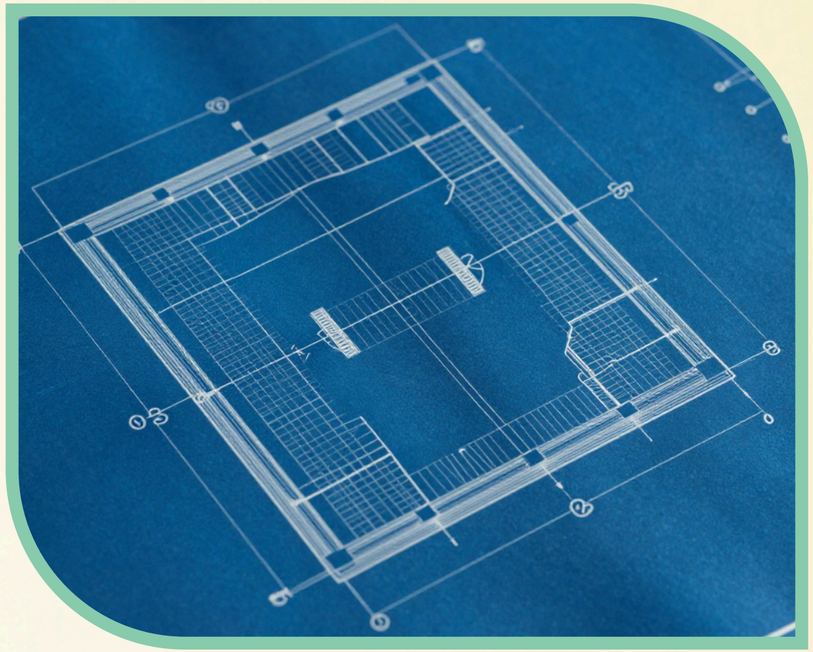
Anna Atkins

In 1843, botanist Anna Atkins used cyanotype to document algae specimens, creating Photographs of British Algae — widely recognized as the first photographically illustrated book.

Her cyanotypes combined rigorous scientific observation with striking artistic composition. Each image was both a specimen record and a visual artwork.

Discussion: Is what Anna Atkins made science, art, or both?

From Algae to Blueprints



The Two-Part Mixture

- Ferric ammonium citrate supplies iron(III) ions to the coating
- Potassium ferricyanide helps form the final blue pigment
- Mixed together and brushed onto paper, the coating appears pale yellow-green
- Key idea: both solutions are water-based, but the final Prussian blue pigment is not

- Always use a pre-prepared sensitizer kit
- Wear gloves and eye protection at all times
- Work under adult supervision only
- Never taste or ingest any chemicals
- Handle in dim light — UV exposure begins the reaction

What UV Light Changes

01.

UV energy changes iron(III) ions into iron(II) ions. This reduction reaction is triggered by ultraviolet light striking the sensitized surface during exposure.

02.

The newly formed iron(II) reacts with ferricyanide to create Prussian blue. Covered areas receive little UV and remain mostly unchanged, washing away during rinsing. Optional formula: $Fe_4[Fe(CN)_6]_3$

Why the Image Has White Shapes

Objects placed on coated paper block UV light from reaching the surface beneath them. Exposed areas absorb UV energy and undergo a chemical reaction that produces Prussian blue — the vivid colour you see in a finished print.

Covered areas receive little or no UV light, so the iron salts remain unchanged and water-soluble. When the paper is rinsed, these unreacted chemicals simply wash away, leaving pale or white shapes behind.

The result is a negative silhouette: the object's outline appears white or pale against a deep blue background. Leaf example — exposed areas: deep blue; blocked areas (under the leaf): white. Every white shape is a record of where light was stopped.

The Process in Six Steps

1. Coat paper in dim light — apply sensitizer evenly
2. Dry completely in darkness before use
3. Arrange flat objects or a transparency on paper
4. Expose under UV light or direct sunlight
5. Rinse thoroughly with cool running water
6. Let the blue deepen as it oxidizes in air

Variables Scientists Can Test

Exposure time — longer exposure deepens blue

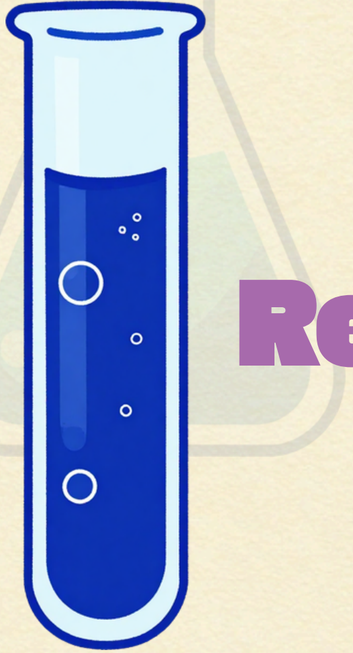
UV intensity & weather — clouds reduce contrast

Paper type & absorbency — affects coating evenness

Object-to-paper distance — closer = sharper edges

Number of coating layers — more layers, richer blue

Predict: Which variable changes contrast most?



Read a Cyanotype Like Evidence

Deep blue areas = strong UV exposure and successful Prussian blue pigment formation. Pale or washed-out blue = underexposure, a weak coating, or rinsing issues. Both results are useful data points for improving your next print.

Blurry or soft edges = the object moved during exposure, or did not lie flat against the paper. White and pale marks reveal exactly where light was blocked — these are the most informative areas on the print.

Frame every mistake as evidence, not failure. A pale print tells you to expose longer; a blurry edge tells you to press objects flat. Scientists and artists both learn by reading what went wrong. What does your print tell you?

Why Cyanotype Still Matters

Cyanotype bridges chemistry, photography, botany, design, and history in a single process.

Artists today use it for textiles, handmade books, experiments, and environmental observation — the same technique invented in 1842 is still alive.

Reflection: What ordinary object could sunlight help you notice differently?