

EXPERIMENT 34: BLUEPRINTING, A PHOTOCHEMICAL PROCESS

Equipment: 3 test tubes, photoflood lamp, pen, print frames.

Materials: 10mL FeCl_3 , 5mL $\text{H}_2\text{C}_2\text{O}_4$ (oxalic acid), drops (3 mL) $\text{K}_3\text{Fe}(\text{CN})_6$ (potassium ferri cyanide), ferric ammonium citrate, India ink, white paper, tracing paper

In this experiment you will learn how to make and use blueprinting paper.

- A. Add equal (5 mL) amounts of oxalic acid solution and FeCl_3 to a test tube and shake. Pour half of the resulting solution into a second test tube. Pour 5mL of FeCl_3 into a third test tube. Place one of the first two test tubes under the hood, or some place to keep it out of the light as far as possible. Expose the second and third (containing only the FeCl_3) tubes, for 3 to 5 minutes to sunlight or a 500 Watt photoflood lamp. Test the contents of each test tube by adding a few drops of $\text{K}_3\text{Fe}(\text{CN})_6$.

Note the color of the FeCl_3 _____ and $\text{H}_2\text{C}_2\text{O}_4$ _____

1. In which test tubes does a blue precipitate appear? _____
2. Which ion does this show is present, Fe^{+++} or Fe^{++} ? _____
3. How can the presence of this ion be explained? _____
4. Complete and balance the equation: $\text{FeCl}_3 + \text{H}_2\text{C}_2\text{O}_4 \rightarrow \text{HCl} + \text{CO}_2 + \text{_____}$
(oxalic acid)
- B. Coat a piece of plain white paper (about 3" X 4") with a solution of ferric ammonium citrate. This may be accomplished by holding the paper by one corner and drawing it over the surface of the ferric ammonium citrate solution. Dry the paper by waving it in the air, and as far as possible keeping it out of strong light. While waiting for the paper to dry, draw a design, or write, using India ink, on tracing paper. When the paper is perfectly dry, place the tracing paper onto the paper coated with the ferric ammonium citrate and place both in a printing frame. The tracing paper should be next to the glass in the frame. Expose the paper in the frame to the light for 3 to 5 minutes depending upon how strong the light is. Then take the paper out and dip it in a solution of $\text{K}_3\text{Fe}(\text{CN})_6$ for a moment, and immediately wash the paper with running tap water.
5. Describe and explain the result. _____

6. Why was the washing with water necessary? _____

7. In this experiment what substance was oxidized? _____

CONCLUSIONS

The blueprint process depends upon the _____ of Fe^{+++} to Fe^{++} by means of a _____ agent in the presence of light.

Attach your blueprint to your report.