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# Ninhydrin

## TECHNICAL NOTES

### Background

Various solutions of Ninhydrin may be used to develop latent prints on porous surfaces such as paper, cardboard, and wood. Ninhydrin reacts with amino acids commonly found in latent print residue to form a purple compound, yielding latent prints visible in shades ranging from reddish-purple to brownish-purple.

### Safety

Precautions should be taken to avoid contact with both the powder form and the liquid solutions of Ninhydrin. Nitrile gloves should be worn, as latex gloves deteriorate with some of the solvents used, most notably acetone. A dust mask and goggles should also be worn to prevent the chemical or solvent getting into the eyes. In addition, some of the solvents used are flammable and must be mixed and used in a fume hood, away from all sources of heat or spark. If using Ninhydrin mixed in a flammable liquid at a crime scene, a full-face breathing apparatus should be worn and avoid any source of heat or spark.

### Mixing Variations

#### **Solution 1: (Alternative to Freon Formulation)**

Dissolve 5 grams Ninhydrin crystals in 45 ml ethanol. Add 2 ml ethyl acetate and 5 ml acetic acid. Add this stock solution to 1 liter of 3M™ Novec™ Engineered Fluid HFE-7100 to prepare a working solution. 3M™ Novec™ Engineered Fluid HFE-7100 is a replacement solvent for Freon, which has been banned for being an ozone depleter. 3M™ Novec™ Engineered Fluid HFE-7100 is safe to use without a fume hood and does not run most inks. This formula is recommended by the Home Office as an alternative to the Freon mixture.

#### **Solution 2:**

Dissolve 25 grams of Ninhydrin crystals in one gallon (or 4 liters) of acetone or alcohol solvent. This solution can be mixed in small quantities using the same proportions. This solution works reasonable well, but will cause many inks to run badly.

### **Solution 3:**

In a 500 ml separatory funnel, place 3.8 grams of Ninhydrin crystals and 20 ml of methyl alcohol (methanol). Shake the funnel, being careful to aim the two ends away from the face and eyes, and being certain to release the pressure in the funnel frequently. Add 480 ml of petroleum ether and again, shake the funnel to mix the two solutions together. Hold the funnel away from the face and eyes and release the pressure frequently. Allow the solution to stand for approximately 10 minutes.

There will be two distinct layers of solution. The lower layer will be smaller in proportion and yellow in color. Shake the funnel again and allow it to stand for 5 more minutes. Drain the bottom layer into a beaker or other container and save it. The clear layer is working solution. Place it into a dark colored plastic or glass container and label it properly.

Pour the saved yellow solution back into the separatory funnel and add 480 ml of petroleum ether to it. Shake it and allow it to stand for 10 minutes. Shake it again and let it stand for about 5 minutes. Drain the bottom yellow layer and discard it. The clear layer is additional working solution. Place it into the dark colored container and properly label it.

### **Method**

Because of the nature of some of the chemicals involved, any use of the solution should be done in a fume hood or while wearing a full-face breathing apparatus respirator. Just using the product outside in the "open air" is not sufficient protection against the potential hazards involved. It is recommended to apply Ninhydrin solution by painting or dipping. For dipping, glass, metal or plastic trays can be used. Metal, plastic or wooden tweezers or forceps can be used to move the paper items in and out of the tray of Ninhydrin. Immerse the item for a few seconds and remove it from the tray, allowing the excess liquid to drip back into the tray. To paint, hold a cotton ball with a pair of forceps, dip it into the Ninhydrin solution and lightly brush the surface to wet it. Do not scrub the surface hard.

### **Examination**

After applying the Ninhydrin solution, allow the paper item to air dry inside the fume hood. Latent prints may develop within a few hours or may take a few days at room temperature. Additional applications of the Ninhydrin solution can be done each day. To speed up the development process, apply humid heat. This can be done in a humidity cabinet or chamber or by the use of a steam iron. If a steam iron is used, be cautious not to touch the paper directly with the iron as it can scorch the paper. Heat a steam iron to a temperature which will give steam. Pass it over the paper several times. If the latent prints are faint, the paper should be dipped again, allowed to dry, and re-steam.

### **Photography**

Photography of latent prints developed with Ninhydrin may be enhanced by using a dark green filter with black and white film. This may improve the contrast.

### **Helpful Hints**

Treatment with Ninhydrin may be done after DFO and before Physical Developer. It is suggested to photograph any latent prints developed after each step before proceeding onto the next step.

**Ordering Information**

- Catalog No. 1-2715 ..... Ninhydrin Crystals, 25 grams
- Catalog No. 1-2716 ..... Ninhydrin Crystals, 100 grams
- Catalog No. 1-2720..... 3M Novec Engineered Fluid, HFE-7100, 1 gallon
- Catalog No. 1-2820..... 3M Novec Engineered Fluid, HFE-71DE, 1 gallon
- Catalog No. 1-2701..... Ninhydrin Spray, 8oz