



## Ozone-Safe Solvent Used by Crime Labs to Develop Fingerprints

### Synopsis

After extensive testing, Vertrel® XF specialty fluid was found to be a highly effective at developing fingerprints from porous surfaces from which fingerprints could not have normally been developed.

### Background

Police investigators often have to find and “develop” (that is, make visible) latent fingerprints from a variety of difficult surfaces. Porous surfaces are notoriously difficult substances with which to work. Previously, CFC-113 (usually under the brand name of Freon® TF) was used as a carrier solvent for a special solution which was able to highlight fingerprints from very difficult surfaces. CFC-113 has been banned from production by the Montreal Protocol due to ozone depletion effects.

A CFC-free replacement has been developed using Vertrel® XF specialty fluid. The new blend uses Vertrel® XF specialty fluid and a ninhydrin solution for the development of latent fingerprints on porous surfaces. The solution is based on HFC 43-10mee, known as Vertrel® XF specialty fluid. This is a nonflammable, zero ozone-depleting CFC replacement. The formulation is very close to the CFC-113-based formula used since the 1970s.

The new formulation is:

Ninhydrin	5 g
Ethanol	15 ml
Ethyl Acetate	5 ml
Acetic Acid	10 ml
Vertrel® XF	1000 ml

Notes: Ethyl acetate is included in the formulation to inhibit the formation of water from the esterification reaction of the acid and alcohol. This acetate can be replaced with ethanol, and molecular sieves should be placed in the stored solution to adsorb any water formation.

The following advantages were found for the new formulation:

- Nonflammable
- Low toxicity
- Highly volatile
- Relatively nonpolar and, therefore, does not diffuse handwriting inks
- Has only limited effect on security features used in check paper
- Forms a stable concentrate of working solutions with ninhydrin
- Uses standard formulation with moderate alcohol percentage, similar to previous CFC formulation
- Similar or improved fingerprint development compared to CFC-113 over 14-day test.

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