



TECHNICAL INFORMATION

DFO (1,8-Diazafluoren-9-One)

Catalog Nos. LV500, LV5001, LV500L, DFS300, DFS300H

BACKGROUND AND PURPOSE

DFO (1,8-diazafluoren-9-one) is an analog of ninhydrin that reacts with amino acids, and is an effective reagent for developing latent fingerprints on porous surfaces. Due to its fluorochrome properties, DFO has the additional ability when used with the proper alternate light and filter, to fluoresce and enable the examiner to eliminate patterned and multicolor backgrounds of latent prints.

Discovered in the 1950's, DFO wasn't used for fingerprint development until the late 1980's. Research conducted by the British Home Office showed DFO to be a very effective latent print developing reagent, revealing twice as many fingerprints as standard ninhydrin. Further research refined the mixture of DFO, introducing acetic acid and various solvents to refine the reactivity.

HEALTH/SAFETY

- Consult the proper SDS for each chemical prior to using.
- PPE Recommended: safety glasses, latex gloves, vented/filtered hood or N95 mask
- DFS300 is highly flammable and should be kept away from heat sources and open flames when used and in storage.

EQUIPMENT

Preparation:

- Stirring plate and magnetic stirrer
- Glass beakers
- Graduated cylinder (100 ml)
- Chemical resistant bottles for storage
- OPTIONAL: spray head / pump spray for bottle
- OPTIONAL: shallow tray (dip method)

Observation:

- 450nm light source (BLUEMAXX BM500, BM600, BMK250A)
- Orange filter and/or goggles
- Orange filter (photography)

PREPARATION

DFO should be mixed in two steps, first as a stock solution, and then as a working solution. The objective of the stock solution is to properly dissolve the DFO powder, and the objective of the working solution is addition of a solvent for penetration and fast drying of the porous substrate.

STOCK SOLUTION (FBI Latent Print Processing Guide)

Chemical	Amount
Methanol	200 ml
Ethyl Acetate	200 ml
Glacial Acetic Acid	40 ml
DFO	1 g

Combine chemicals with DFO powder in beaker using magnetic stirrer. Mix until powder is completely dissolved.

WORKING SOLUTION:

Dilute the stock solution to 2 L by adding petroleum ether. The working solution should be a clear gold color.

STOCK and WORKING solution have a shelf life of 6+ months.

Alternative solution:

Use of petroleum ether can be detrimental to inks and certain paper substrates, as well as highly flammable. This alternate formulation was developed by the Canadian Police Research Center and was shown to yield superior results in latent development.

STOCK SOLUTION

Chemical	Amount
Methanol	120 ml
Acetic Acid	80 ml
DFO	1 g

Combine chemicals with DFO powder in beaker using magnetic stirrer. Mix until powder is completely dissolved.

Each of these solutions are available premixed.

- DFS300: DFO solution (Petroleum Ether)
- DFS300H: DFO Solution (Novec HFE)

USAGE INSTRUCTIONSApplication of solution:

DFO solution can be applied by either spraying directly onto the substrate or by dipping the substrate into a solution.

Immersion / Dip Method:

Using a shallow tray, pour enough solution to completely cover the document/substrate.

Draw the substance through the solution slowly using forceps or other similar device. Remove and allow excess solution to drip/run off.

Spray application:

Holding or hanging the document / substrate vertically, spray the DFO solution onto the substrate until saturated. Be sure to spray both sides of the substrate for full development of all potential prints.

WORKING SOLUTION:

Chemical	Amount
Stock Solution	200 ml
Novec HFE 71DE	1.2 L
Novec HFE 7100	2.8 L

Blend the two Novec HFE solvents in a separate container. Using a 4L container, add the Stock Solution, then the HFE solvent blend. Mix with a magnetic stirrer for 30 minutes. Working solution has a shelf life of 6+ months.



DFS300

TI02-28ENG-REV8

Development:

Development of prints is best achieved by placing the substrate in an oven at 100°C (212°F) for 20-30 minutes. Sirchie offers two DFO development ovens for this purpose, model DFC100 for small applications, and model DFC200 for larger applications.

If an oven is not available, a dry iron on highest heat can be utilized. Place the substrate between two cotton cloths and rub the dry iron over the surface continuously. Development will require 5-8 minutes.

Observation:

Some latent prints may be visible under normal lighting conditions, but DFO is best viewed under 450 nm light using orange barrier goggles or filters. The fingerprints will fluoresce orange. If background still persists, prints can be observed using a green light (520 nm) and a red barrier filter.



DFO developed latent



STORAGE / DISPOSAL

Stock and Working solutions should be stored at room temperature away from light and any heat source. Disposal should be done according to Federal, State, and Local regulations for the disposal of solvents.

REFERENCES

1. DFO (1,8-Diazafluoren-9-One), Processing Guide for the Development of Latent Prints, Federal Bureau of Investigation. 2000
2. Diazafluoren-9-one (DFO): Fingerprint mark development techniques within scope of ISO 17025, Fingerprint Source Book, Home Office. UK. 2013
3. Wilkinson, Della. Doris Rumsby, Brian Babinc, Mike Merritt, Jim Marsh. The Results from a Canadian National Field Trial Comparing 1,8-Diazafluoren-9-one (DFO) with Ninhydrin and the Sequence DFO Followed by Ninhydrin. Canadian Police Research Center, Ottawa, Ontario. 2005