

Iron Oxide Powder Suspension

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Iron Oxide Powder Suspension

1 INTRODUCTION/SCOPE

Iron Oxide Powder Suspension (IOPS) is used by FBI Laboratory Friction Ridge Discipline personnel to develop latent prints on rubber-based adhesive surfaces. [Note “IOPS” and “IOP” are approved abbreviations for this process.]

2 STANDARDS AND CONTROLS

See *Processing Overview* (FRD-300).

3 LIMITATIONS

- A. IOPS should be applied to rubber-based adhesives only.
- B. Heavy background may develop.

4 EQUIPMENT

- Sigma-Aldrich iron (II/III) oxide powder (50 nm – 100 nm)
- Tween® 20
- Applicator(s)
- Distilled Water

5 PROCEDURE

5.1 Mixture Preparation

Personnel will prepare stock and working mixtures as follows: [Alternative amounts may be prepared, provided the same ratio of chemicals mixed is retained.]

5.1.1 10% Tween 20 stock solution

- A. Combine:
 - Tween 20 – 10 mL
 - Water – 90 mL
- B. Stir and ensure thorough mixing.

5.1.2 Iron Oxide Powder Suspension (IOPS) working suspension

- A. Combine:
 - Iron (II/III) oxide powder (50 nm – 100 nm) – 1 g
 - Tween 20 stock solution – 2 mL
- B. Mix until a smooth paste is formed.

5.2 Application

- A. A spot test is recommended to determine if heavy background staining occurs on the adhesive surface.
 1. If heavy background staining develops, a different adhesive processing technique is recommended.

- B. Personnel will complete the following steps in order:
 1. Apply IOPS to the adhesive surface.
 2. Leave suspension on the item for at least 10 seconds, but no more than 5 minutes.
 - i. Personnel must ensure IOPS does not dry on the item.
 3. Rinse with a slow stream of water.
 - i. Suspension may be reapplied as needed using steps 1 through 3 so long as personnel are cautious of background overdevelopment.
 4. Allow the item to dry.
- C. Capture friction ridge detail as applicable (digitally or photographically).

5.3 Storage

- A. Tween 20 stock solution must be stored at room temperature and in any type of laboratory acceptable receptacle.
- B. IOPS working suspension must be stored at room temperature and in a closed container.

5.4 Shelf Life

- A. Tween 20 stock solution has a 12-month shelf life provided the reagent checks are satisfactory.
- B. IOPS working suspension has a 6-month shelf life provided the reagent checks are satisfactory.

6 SAFETY

- A. Iron (II/III) oxide powder should be handled in a fume hood until in suspension.
 1. Application may occur outside a fume hood.
- B. Items processed with IOPS do not have special handling requirements.
- C. Replace PPE when soiled with iron (II/III) oxide powder or significant amounts of dried IOPS.
- D. See FBI Laboratory Safety Manual for appropriate information.

7 REVISION HISTORY

Revision	Issued	Changes
00	05/16/2022	New Document Issued.
01	12/14/2023	Updated document to remove restriction on type of tape and modify suspension processing time as well as mention of spot testing. Modified term “detergent” with reference to actual solution name. Section 3 B – added clarification on background. Section 4 – generalized applicators. Section 5.4-B – added shelf life. Section 6-A – updated handling instructions.