

Form	Deviation Request Form
Title	Technical Procedure for Reagent Preparation
Laboratory Location	Lab-wide
Discipline/Section	Firearms
A. Requested deviation applies to:	Technical Procedure for Reagent Preparation Sections 5.1.4.1, 5.2.4.1, 5.3.4.1, 5.4.4.1, 5.5.4.1, 5.6.4.1, 5.7.4.1, 5.9.4.1, and 5.10
B. Requested deviation:	<p>Replace 5.1.4.1, 5.3.4.1, 5.4.4.1, 5.5.4.1, 5.6.4.1, 5.7.4.1, and 5.9.4.1 with "Expires when a component of the reagent being prepared expires or if reagent fails quality control prior to use, see 5.10.1."</p> <p>Replace 5.2.4.1 with "N/A - Cleaning solution."</p> <p>New 5.10.1: "Etchant Quality Control (Reactivity) Check"</p> <p>New 5.10.1.1: "Test the strength of the chemical solution in an area adjacent to the polished serial number area. Ideally, the solution should not bubble or fizz when it comes in contact with the metal, but the area should slowly darken due to oxidation. Dilute the chemical solution with distilled water as necessary, see 7.1."</p>
C. Necessity for the deviation:	To prolong the use of the chemical etchants used during serial number restoration and to include how to quality check the prepared reagents.
D: Technical Review and Authorization	
Technical Authorization	Yes - Authorized
Technical Authorizer	<input type="checkbox"/> Slish, Jennifer
Duration	1 year / next procedure revision

E: Quality Assurance Authorization

Acceptable within general QA guidelines and good laboratory practice? Yes

Significant negative impact to Crime Laboratory Quality System? No

QA Authorization Yes - Authorized

QA Authorizer Suggs, Timothy

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Created at 4/5/2023 12:09 PM by Quirindongo, Dana

Last modified at 6/11/2024 1:25 PM by Suggs, Timothy

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Technical Procedure for Reagent Preparation

1.0 Purpose – To provide guidelines for preparing reagents used in casework in the Firearms Section.

2.0 Scope – This procedure applies to all reagents used in the Firearms Section.

3.0 Definitions – N/A

4.0 Equipment, Materials, and Reagents

- Birchwood Casey reagent (Brass Cartridge Case Cleaner)
- Cupric chloride
- Ethyl alcohol
- Ferric chloride
- Hydrochloric acid (Certified A.C.S. *Plus*)
- Nitric acid
- Sodium hydroxide
- 10N Sodium hydroxide
- diH₂O (deionized water)
- Balance
- Beakers
- Graduated cylinders
- Hot plate
- Magnetic stir rods
- Spatulas
- Stirring rods
- Weigh boats
- Fume hood
- Safety Data Sheets (SDS)

5.0 Procedure

5.1 Acidic Ferric Chloride Solution

5.1.1 Required Items

- Ferric chloride
- Hydrochloric acid (Certified A.C.S. *Plus*)
- diH₂O

5.1.2 Instructions for Preparation

5.1.2.1 This solution may be mixed in any amount that maintains the original ratio.

	<u>For 125 mL</u>	<u>For 375 mL</u>
Ferric chloride	25 g (385.81 gr)	75 g (1157.43 gr)
Hydrochloric acid	25 mL	75 mL
diH ₂ O	100 mL	300 mL

5.1.2.2 Combine ferric chloride with diH₂O. Then add hydrochloric acid and stir until the ferric chloride is no longer visible in the solution. The solution will appear as an orange color.

5.1.3 Storage Conditions

5.1.3.1 Store at room temperature in the top tray of the serial number kit or appropriate storage cabinet.

5.1.4 Expiration Date

5.1.4.1 Expires one (1) year after preparation.

5.2 **5% Cartridge Case Cleaning Solution**

5.2.1 Required Items

- Birchwood Casey reagent (Brass Cartridge Case Cleaner)
- diH₂O

5.2.2 Instructions for Preparation

5.2.2.1 This solution may be mixed in any amount that maintains the original ratio.

	<u>For 100 mL</u>	<u>For 500 mL</u>
Birchwood Casey	5 mL	25 mL
diH ₂ O	95 mL	475 mL

5.2.2.2 Combine Birchwood Casey Cartridge Case Cleaner with diH₂O.

5.2.3 Storage Conditions

5.2.3.1 Store at room temperature.

5.2.4 Expiration Date

5.2.4.1 Expires one (1) year after preparation.

5.3 **Davis Reagent Solution**

5.3.1 Required Items

- Cupric chloride
- Hydrochloric acid (Certified A.C.S. *Plus*)
- diH₂O

5.3.2 Instructions for Preparation

5.3.2.1 This solution may be mixed in any amount that maintains the original ratio.

	<u>For 100 mL</u>	<u>For 300 mL</u>
Cupric chloride	77.16 gr	231.49 gr
Hydrochloric acid	50 mL	150 mL
diH ₂ O	50 mL	150 mL

5.3.2.2 Combine cupric chloride with deionized water. Then add hydrochloric acid and stir until the cupric chloride is no longer visible in the solution. The solution will appear as a dark green color.

5.3.3 Storage Conditions

5.3.3.1 Store at room temperature in the top tray of the serial number kit or appropriate storage cabinet.

5.3.4 Expiration Date

5.3.4.1 Expires one (1) year after preparation.

5.4 Ferric Chloride Solution

5.4.1 Required Items

- Ferric Chloride
- diH₂O

5.4.2 Instructions for Preparation

5.4.2.1 This solution may be mixed in any amount that maintains the original ratio.

	<u>For 100 mL</u>	<u>For 300 mL</u>
Ferric chloride	25 g (385.81 gr)	75 g (1157.43 gr)
diH ₂ O	100 mL	300 mL

5.4.2.2 Combine ferric chloride with diH₂O and stir until the ferric chloride is no longer visible in the solution. The solution will appear as an orange color.

5.4.3 Storage Conditions

5.4.3.1 Store at room temperature in the top tray of the serial number kit or appropriate storage cabinet.

5.4.4 Expiration Date

5.4.4.1 Expires one (1) year after preparation.

5.5 Fry's Reagent

5.5.1 Required Items

- Cupric chloride

- Hydrochloric acid (Certified A.C.S. *Plus*)

5.5.2 Instructions for Preparation

5.5.2.1 This solution may be mixed in any amount that maintains the original ratio.

Cupric chloride	enough for super-saturation
HCl	100 mL -200 mL

5.5.2.2 Dissolve cupric chloride in hydrochloric acid until the solution is super-saturation. Super-saturation occurs when cupric chloride will no longer go into solution. The saturated solution will appear as a very dark green color.

5.5.3 Storage Conditions

5.5.3.1 Store at room temperature in the top tray of the serial number kit or appropriate storage cabinet.

5.5.4 Expiration Date

5.5.4.1 Expires one (1) year after preparation.

5.6 25% Nitric Acid Solution

5.6.1 Required Items

- Nitric acid
- diH₂O

5.6.2 Instructions for Preparation

5.6.2.1 This solution may be mixed in any amount that maintains the original ratio.

	<u>For 300 mL</u>
Nitric acid	75 mL
diH ₂ O	225 mL

5.6.2.2 Add nitric acid to diH₂O and mix.

5.6.3 Storage Conditions

5.6.3.1 Store at room temperature in the top tray of the serial number kit or appropriate storage cabinet.

5.6.4 Expiration Date

5.6.4.1 Expires one (1) year after preparation.

5.7 10% Sodium Hydroxide Solution

5.7.1 Required Items

- Sodium hydroxide
- diH₂O

5.7.2 Instructions for Preparation

5.7.2.1 This solution may be mixed in any amount that maintains the original ratio.

	<u>For 90 mL</u>	<u>For 270 mL</u>
Sodium hydroxide	10 g (154.32 gr)	30 g (462.97 gr)
diH ₂ O	90 mL	270 mL

5.7.2.2 Dissolve sodium hydroxide in diH₂O until the pellets are no longer visible.

5.7.3 Storage Conditions

5.7.3.1 Store at room temperature in the top tray of the serial number kit or appropriate storage cabinet.

5.7.4 Expiration Date

5.7.4.1 Expires one (1) year after preparation.

5.8 2N Sodium Hydroxide Solution

5.8.1 Required Items

- 10N sodium hydroxide or sodium hydroxide
- diH₂O

5.8.2 Instructions for Preparation (Method 1)

5.8.2.1 This solution may be mixed in any amount that maintains the original ratio.

	<u>For 100 mL</u>	<u>For 500 mL</u>
10N sodium hydroxide	20 mL	100 mL
diH ₂ O	80 mL	400 mL

5.8.2.2 Combine 10N sodium hydroxide with diH₂O. The volume prepared should be only the necessary volume for appropriate waste disposal.

5.8.3 Instructions for Preparation (Method 2)

5.8.3.1 This solution may be mixed in any amount that maintains the original ratio.

	<u>For 100 mL</u>
Sodium hydroxide	123.46 gr
diH ₂ O	100 mL

5.8.3.2 Dissolve sodium hydroxide in diH₂O until the pellets are no longer visible. The volume prepared should be only the necessary volume for appropriate waste disposal.

5.8.4 Storage Conditions

5.8.4.1 N/A – Only enough solution is made for immediate use.

5.8.5 Expiration Date

5.8.5.1 N/A – Only enough solution is made for immediate use.

5.9 **Turner's Reagent**

5.9.1 Required Items

- Cupric chloride
- Hydrochloric acid (Certified A.C.S. *Plus*)
- Ethyl alcohol
- diH₂O

5.9.2 Instructions for Preparation

5.9.2.1 This solution may be mixed in any amount that maintains the original ratio.

	<u>For 100 mL</u>	<u>For 300 mL</u>
Cupric chloride	38.58 gr	115.74 gr
Hydrochloric acid	40 mL	120 mL
Ethyl alcohol	25 mL	75 mL
diH ₂ O	30 mL	90 mL

5.9.2.2 Combine cupric chloride with diH₂O. Then add hydrochloric acid and ethyl alcohol. Stir until cupric chloride is no longer visible in the solution. The solution will appear as a light green color.

5.9.3 Storage Conditions

5.9.3.1 Store at room temperature in the top tray of the serial number kit or appropriate storage cabinet.

5.9.4 Expiration Date

5.9.4.1 Expires one (1) year after preparation.

5.10 **Standards and Controls** – N/A

5.11 **Calibration** – N/A

5.12 **Maintenance** – N/A

5.13 Sampling – N/A

5.14 Calculations – N/A

5.15 Uncertainty of Measurement – N/A

6.0 Limitations – N/A

7.0 Safety

7.1 Always add acid to water, not water to acid.

8.0 References – N/A

9.0 Records

- Reagent Prep Logs

10.0 Attachments – N/A

Revision History		
Effective Date	Version Number	Reason
06/25/2021	6	Header and throughout– corrected to reflect organizational change. Throughout – removed chemicals and supplies for distance determination examinations. 7.1-new