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
- diH_2O (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*)
- diH_2O

5.1.2 Instructions for Preparation

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

	For 125 mL	For 375 mL
Ferric chloride	25 g (385.81 gr)	75 g (1157.43 gr)
Hydrochloric acid	25 mL	75 mL
diH_2O	100 mL	300 mL

5.1.2.2 Combine ferric chloride with diH_2O. 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)
- diH_2O

5.2.2 Instructions for Preparation

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

	For 100 mL	For 500 mL
Birchwood Casey	5 mL	25 mL
diH_2O	95 mL	475 mL

5.2.2.2 Combine Birchwood Casey Cartridge Case Cleaner with diH_2O.

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*)
- diH_2O

5.3.2 Instructions for Preparation

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

	For 100 mL	For 300 mL
Cupric chloride	77.16 gr	231.49 gr
Hydrochloric acid	50 mL	150 mL
diH_2O	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
- diH_2O

5.4.2 Instructions for Preparation

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

	For 100 mL	For 300 mL
Ferric chloride	25 g (385.81 gr)	75 g (1157.43 gr)
diH_2O	100 mL	300 mL

5.4.2.2 Combine ferric chloride with diH_2O 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
- diH_2O

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_2O	225 mL

5.6.2.2 Add nitric acid to diH_2O 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
- diH_2O

5.7.2 Instructions for Preparation

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

	For 90 mL	For 270 mL
Sodium hydroxide	10 g (154.32 gr)	30 g (462.97 gr)
diH_2O	90 mL	270 mL

5.7.2.2 Dissolve sodium hydroxide in diH_2O 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
- diH_2O

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.

	For 100 mL	For 500 mL
10N sodium hydroxide	20 mL	100 mL
diH_2O	80 mL	400 mL

5.8.2.2 Combine 10N sodium hydroxide with diH_2O. 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.

	For 100 mL
Sodium hydroxide	123.46 gr
diH_2O	100 mL

5.8.3.2 Dissolve sodium hydroxide in diH_2O 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
- diH_2O

5.9.2 Instructions for Preparation

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

	For 100 mL	For 300 mL
Cupric chloride	38.58 gr	115.74 gr
Hydrochloric acid	40 mL	120 mL
Ethyl alcohol	25 mL	75 mL
diH_2O	30 mL	90 mL

5.9.2.2 Combine cupric chloride with diH_2O. 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