Technical Procedure for Preliminary Color Tests

1.0 Purpose - This procedure specifies the required elements for the preparation and use of preliminary color test reagents.

2.0 Scope - This procedure applies to all preliminary color tests used in the Drug Chemistry Sections of the State Crime Laboratory.

3.0 Definitions

- **Prepared reagent –** Mixture of two or more reagents or a dilution.
- **Commercial reagent –** Solvent or chemical purchased from an outside vendor.
- **Performance verification** – The initial confirmation of the reliability of a previously or externally validated method or instrument.
- **Quality control (QC) checks** – Periodic confirmation of the reliability of equipment, instrumentation, and/or reagents.
- **Reference material –** Material sufficiently homogenous and stable, with reference to specified properties, which has been established to be fit for its intended use in measurement or in examination of nominal properties.

4.0 Equipment, Materials and Reagents

4.1 Equipment

- Balance

4.2 Materials and Reagents

- Fume hood
- Eye protection
- Laboratory coat
- Gloves
- Beakers or other glass vessels (Optional)
- Culture tubes (6 X 50 mm suggested size)
- Funnel
- Glass stirring rod
- Graduated cylinder
- Pipettes with bulb
- Porcelain spot plates (Black suggested for Barium Chloride Reagent)
- Reagent bottles (amber-colored required for Duquenois reagent)
- Spatula
- Weigh boats or other weigh vessels
- Filter paper (PDMAB and Koppanyi only)
- Scissors (PDMAB and Koppanyi paper only)
- Wide mouth bottles with tops (suggested for storage of PDMAB and Koppanyi Paper)
- Commercial Reagents (ACS grade or higher)
- Reference materials

5.0 Procedure

5.1 Standards and Controls – Quality control checks of all reagents shall consist of a negative check and a positive check. Both checks shall be acceptable according to the procedure listed for each reagent, and shall be recorded together as a quality control check in the Resource Manager section of FA.

5.1.1 Negative quality control checks shall be performed according to the procedure listed with no sample present.

5.1.1.1 Acceptable result is no significant color formation.

5.1.1.2 If a significant color develops, steps shall be taken until no significant color develops, including ensuring the spot plate or culture tube is clean and re-cleaning any utensils used. Making new reagent and retesting with no sample present are further steps that can be taken to ensure no significant color develops prior to introduction of the sample.

5.1.2 Positive quality control checks shall be performed according to the procedure listed for each reagent. Any of the reference materials outlined in the listed procedure may be used. See each procedure for acceptable results.

5.1.2.1 The result of the quality control check shall be recorded in the FA Resource Manager with the identification of the standard used and the results of the QC check.

5.1.3 Reagents may be prepared in any amount provided that the component ratios are kept constant.

5.1.4 Labeling - All bottles shall be labeled according to the Administrative Policy for Drug Chemistry Quality Assurance and the Laboratory Safety Manual: Chemical Hygiene Plan and Hazardous Communication Program.

5.1.5 Storage - Solutions shall be stored in closed containers. Bottles may be kept on the countertop or under the hood, unless otherwise noted in the procedure.

5.1.6 Unless otherwise specified in the technical procedures below, quality control rechecks and reagent expiration shall adhere to the Administrative Policy for Drug Chemistry Quality Assurance to ensure reagent reliability.

5.1.7 Application of Procedures on Evidence – (Specific instructions are included in the technical procedures below that utilize more than one reagent.).

5.1.7.1 Add 1-2 drops of the reagent to a clean spot well or a new culture tube, and ensure no significant color develops.

5.1.7.2 Add a small amount of sample to the reagent in the spot well or culture tube.

5.1.7.3 Observe any reaction or color produced.

5.1.7.4 Record results in the FA case file if test is being performed for casework or FA Resource Manager if test is being performed for quality control purposes.

5.1.8 Marquis

5.1.8.1 This color test reacts with opiates and phenethylamines, as well as some non-controlled substances, to produce colored intermediates.

5.1.8.2 Add 8-10 drops of formaldehyde solution to 10 milliliters of concentrated sulfuric acid, with stirring.

5.1.8.3 The expiration date for this reagent shall be one month after preparation.

5.1.8.4 Lot number: Eight digit format year/month/day/Mq/initials of preparer. Example: 20101231MqXXX

5.1.8.5 QC check: Guaifenesin produces a purple color.

5.1.8.6 Results: Opiates (heroin, oxycodone) – purple
(Meth)amphetamine; fentanyl – orange
MDA/MDMA – purple/black
Aspirin – slow cherry red

5.1.9 Duquenois-Levine (Modified)

5.1.9.1 This color test reacts with marijuana, hashish, and cannabinoids to produce a violet blue color that transfers to the chloroform layer, which is considered a proper/positive result

5.1.9.2 **Duquenois (A) -** Dissolve 2.0 grams of vanillin and 2.5 milliliters of acetaldehyde in 100 milliliters of ethanol.

5.1.9.2.1 Amber-colored bottles shall be used to protect this reagent from light**.**

5.1.9.2.2 Solution shall be stored in the refrigerator.

5.1.9.2.3 Lot number: Eight digit format year/month/day/Duq/initials of preparer**.** Example: 20101231DuqXXX

5.1.9.3 Concentrated Hydrochloric Acid (B)

5.1.9.3.1 Prepare a (dropper) bottle of concentrated hydrochloric acid.

5.1.9.4 Chloroform (C)

5.1.9.4.1 Prepare a (dropper) bottle of chloroform.

5.1.9.5 Application of Procedure on Evidence

5.1.9.5.1 Place a small amount of sample in a culture tube or spot plate.

5.1.9.5.2 Add two to three drops of the Duquenois reagent (A).

5.1.9.5.3 Add at least an equal volume of concentrated hydrochloric acid (B) and observe any color changes.

5.1.9.5.4 Add at least two to three drops of chloroform (C) and agitate.

5.1.9.5.5 Allow phases to separate and observe the color in the (bottom) chloroform layer.

5.1.9.5.6 Record results in the FA case file if performing casework, or in the Resource Manager section of FA if performing a QC check.

5.1.9.5.7 QC check: Marijuana produces a violet blue color after addition of the hydrochloric acid. For a positive result, this color shall transfer to the chloroform layer with shaking.

5.1.9.5.8 Results: Marijuana, hashish, cannabinoids – violet blue color after addition of the hydrochloric acid, which extracts into the chloroform layer with shaking.

5.1.9.6 Limitations

5.1.9.6.1 For wet or fresh plant material, the color development may be hindered. In these cases, wash the wet or new plant material with the Duquenois reagent quickly and decant the reagent to a new culture tube. Proceed with addition of acid and chloroform as described in the procedure.

5.1.9.6.2 For old plant material or very young plant material, the color development may be hindered. In these cases, place the material in a culture tube. Cover with petroleum ether and let sit for approximately two minutes. Decant the petroleum ether to a clean culture tube. Evaporate petroleum ether on hot plate. (Set tube in a beaker for support if needed.) Proceed with addition of Duquenois reagent, acid, and chloroform, to the residue left from the petroleum ether wash.

5.1.9.6.3 If color formation is slow, a small amount of heat may be added to the plant material and Duquenois reagent to facilitate color development.

5.1.9.6.4 For smoking devices and/or paraphernalia, the item may be washed with chloroform to remove the marijuana residue. Duquenois-Levine reagent and acid are then added to a portion of the chloroform wash as described in the procedure.

5.1.10 Cobalt Thiocyanate

5.1.10.1 This color test reacts with secondary and tertiary amines, as well as some alkaloids, to produce a blue color.

5.1.10.2 Dissolve 0.38 gram of ammonium thiocyanate in 25 ml water, and then slowly add 0.63 gram cobaltous acetate with stirring.

5.1.10.3 Alternate recipe: Dissolve 1.5 grams of cobalt thiocyanate in 29.0 milliliters of water.

5.1.10.4 Lot number: Eight digit format year/month/day/Cobalt/initials of preparer. Example: 20101231CobaltXXX

5.1.10.5 QC check: Cocaine produces a blue color.

5.1.10.6 Results: Cocaine – blue
PCP - blue

5.1.11 Ferric Chloride

5.1.11.1 This color test reacts with phenols, enols, and GHB to produce colored intermediates.

5.1.11.2 Dissolve 1.5 grams of ferric chloride in 29.0 milliliters of water.

5.1.11.3 Lot number: Eight digit format year/month/day/FerChl/initials of preparer. Example: 20101231FerChlXXX

5.1.11.4 QC check: Acetaminophen produces a blue color.

5.1.11.5 Results: Acetaminophen – blue
GHB - red/brown

5.1.12 Koppanyi

5.1.12.1 This color test reacts with barbiturates to produce colored intermediates.

5.1.12.2 Koppanyi Paper (A)

5.1.12.2.1 Dissolve 0.1 gram cobalt acetate in 100 milliliters of methanol.

5.1.12.2.2 Add 0.2 milliliter glacial acetic acid.

5.1.12.2.3 Soak filter paper in the solution and allow to dry completely.

5.1.12.2.4 Cut filter paper into small pieces for use. (Approximate one inch squares suggested.)

5.1.12.2.5 Store filter paper in a wide mouth bottle with top.

5.1.12.2.6 Lot number: Eight digit format year/month/day/Kopp/initials of preparer. Example: 20101231KoppXXX

5.1.12.3 5% Isopropylamine (B)

5.1.12.3.1 Mix 5 milliliters isopropylamine and 95 milliliters methanol. (Approximate 1:20 isopropylamine:methanol ratio.)

5.1.12.3.2 Lot number: Eight digit format year/month/day/KoppSoln/initials of preparer. Example: 20101231KoppSolnXXX

5.1.12.4 Application of Procedure on Evidence

5.1.12.4.1 Place a small amount of sample on a piece of the Koppanyi paper (A).

5.1.12.4.2 Press the sample onto the paper with a spatula (optional).

5.1.12.4.3 Place a drop of the 5 % Isopropylamine solution (B) on the edge of the Koppanyi paper and tilt to allow the drop to meet the sample.

5.1.12.4.4 Record results in the case file if test is being performed for case work or Resource Manager in FA if test is being performed for quality control purposes.

5.1.12.4.5 QC check: Barbiturates produce a red-violet color upon addition of the 5 % Isopropylamine reagent to the Koppanyi paper.

5.1.12.4.6 Results: Barbiturates – red-violet
Oxymorphone HCl – violet
Pseudoephedrine HCl – light green
Psilocybin – blue
Theophylline - violet

5.1.13 Potassium Permanganate

5.1.13.1 This color test reacts with compounds containing reactive double bonds to produce a brown color.

5.1.13.2 Dissolve 0.3 gram potassium permanganate in 30 milliliters of water.

5.1.13.3 Lot number: Eight digit format year/month/day/KMNO4/initials of preparer. Example: 20101231KMNO4XXX

5.1.13.4 Application of Procedure on Evidence

5.1.13.4.1 A culture tube instead of a spot well is suggested for use of this reagent.

5.1.13.4.2 QC check: Opiates produce a brown color.

5.1.13.4.3 Results: Opiates produce a brown color.

5.1.14 para-Dimethylaminobenzaldehyde (PDMAB)

5.1.14.1 This color test uses a filter paper soaked with the reagent. This test reacts with indoles (e.g., LSD), primary aromatic amines (e.g., procaine), and carbamates to produce colored intermediates.

5.1.14.2 PDMAB Paper (A)

5.1.14.2.1 Dissolve 1.0 gram of para-dimethylaminobenzaldehyde (PDMAB) in 100 milliliters of methanol.

5.1.14.2.2 Soak the filter paper in the solution and allow it to dry completely.

5.1.14.2.3 Cut filter paper into small pieces for use. (Suggested 1-inch squares.)

5.1.14.2.4 Store PDMAB paper in wide mouth bottle with top for ease of use.

5.1.14.2.5 Lot number: Eight digit format
year/month/day/PDMABpp/initials of preparer.
Example: 20101231PDMABppXXX

5.1.14.3 Methanol (B)

5.1.14.3.1 Prepare a (dropper) bottle of methanol.

5.1.14.4 Hydrochloric Acid (concentrated) (C)

5.1.14.4.1 Prepare a (dropper) bottle of concentrated hydrochloric acid.

5.1.14.5 Application of Procedure on Evidence

5.1.14.5.1 Place a small amount of sample on a piece of the PDMAB paper.

5.1.14.5.2 Press the sample onto the paper with a spatula. (optional)

5.1.14.5.3 Place a drop of methanol (B) on top of the sample to help it dissolve into the paper.

5.1.14.5.4 Add a drop of hydrochloric acid (C) to the filter paper by one of the following methods:

- Adding the drop directly on the methanol spot.
- Adding the acid drop to the edge of the paper and allowing the acid and methanol spots to meet (e.g., LSD and Psilocin.)
- Allowing the fumes of the acid to contact the paper (e.g., procaine and benzocaine)

5.1.14.5.5 Record results in the case file if test is being performed for casework or Resource Manager in FA if test is being performed for quality control purposes.

5.1.14.5.6 QC check: Procaine produces a yellow-orange color upon addition of the hydrochloric acid to the PDMAB paper.

5.1.14.5.7 Results: Carbamate – yellow
LSD – purple
Psilocin – dark purple
Procaine, Benzocaine – orange/yellow

5.1.15 Froehde

5.1.15.1 This color test reacts with a wide range of aromatic compounds to produce colored intermediates.

5.1.15.2 Dissolve 50 milligrams of molybdic acid (or sodium molybdate) in 25 milliliters of sulfuric acid with heating and stirring.

5.1.15.3 The expiration date for this reagent shall be one month after preparation.

5.1.15.4 Lot Number: Eight digit format year/month/day/Fro/initials of preparer. Example: 20101231FroXXX

5.1.15.5 QC check: Guaifenesin produces a purple color.

5.1.15.6 Results: Acetaminophen – blue
Bufotenine – yellow/brown
Heroin HCl – purple
MDMA – yellow/green to dark blue
MDA – green to olive to blue
Morphine – purple

5.1.16 Mecke

5.1.16.1 This color test reacts with a wide range of aromatic compounds to produce colored intermediates.

5.1.16.2 Add 0.25 gram selenious acid to 25 milliliters of concentrated sulfuric acid with stirring.

5.1.16.3 The expiration date for this reagent shall be one month after preparation.

5.1.16.4 Lot number: Eight digit format year/month/day/Meck/initials of preparer. Example: 20101231MeckXXX

5.1.16.5 QC Check: Guaifenesin produces a green to red color.

5.1.16.6 Results: Bufotenine – brown to black/purple
Diphenhydramine HCl - yellow
Heroin HCl – green/blue
Hydrocodone bitartrate – dark blue
Methadone – green/brown
MDMA – green to dark blue

MDA – green to blue

5.1.17 Silver Nitrate

5.1.17.1 This color test reacts with halide ions to produce a white precipitate.

5.1.17.2 Dissolve 1 gram of silver nitrate in 20 milliliters of water (5 % solution).

5.1.17.3 Lot number: Eight digit format year/month/day/SilNit/initials of preparer. Example: 20101231SilNitXXX

5.1.17.4 **Application of Procedure on Evidence** - A culture tube or black spot plate is suggested for use of this reagent.

5.1.17.4.1 QC Check: Sodium chloride produces a white precipitate.

5.1.17.4.2 Results: All halide salts – white precipitate.

5.1.18 Zwikker

5.1.18.1 This color test reacts with barbiturates to produce a purple color that transfers to the organic layer of the reagent.

5.1.18.2 0.5% Cupric Sulfate (A)

5.1.18.2.1 Dissolve 0.12 gram cupric sulfate in 25 milliliters of water.

5.1.18.2.2 Lot number: Eight digit format year/month/day/Zwik/initials of preparer. Example: 20101231ZwikXXX

5.1.18.3 5% Pyridine (B)

5.1.18.3.1 Add 1 milliliter of pyridine to 24 milliliters of chloroform.

5.1.18.3.2 Lot number: Eight digit format year/month/day/ZwikPyr/initials of preparer. Example: 20101231ZwikPyrXXX

5.1.18.4 Application of Procedure on Evidence

5.1.18.4.1 Place a small amount of sample in a culture tube.

5.1.18.4.2 Add a drop of 0.5 % cupric sulfate (A) and observe any reaction or color change.

5.1.18.4.3 Add a drop of 5 % pyridine (B) and observe any reaction or color change.

5.1.18.4.4 Record results in the FA case file if test is being performed for case work or Resource Manager in FA if test is being performed for quality control purposes.

5.1.18.4.5 QC check: Phenobarbital produces a purple color that transfers to the organic layer.

5.1.18.4.6 Results: Barbiturates – purple or bright green color that transfers to the organic layer.

5.1.19 Barium Chloride

5.1.19.1 This color test reacts with sulfates to produce a white precipitate.

5.1.19.2 Dissolve 3.0 grams of barium chloride in 27 milliliters of water. (10 % solution)

5.1.19.3 Lot number: Eight digit format year/month/day/BaCl/initials of preparer. Example: 20101231BaClXXX

5.1.19.4 Application of Procedure on Evidence – A culture tube or black spot plate is suggested for use of this reagent.

5.1.19.5 QC check: Sodium sulfate produces a white precipitate.

5.1.19.6 Results: Sulfate compounds produce a white precipitate.

5.1.20 Cupric Sulfate (Secondary Amine #1)

5.1.20.1 This color test reacts with secondary amines to produce a yellow/brown color in the organic phase.

5.1.20.2 Cupric Sulfate (A)

5.1.20.2.1 Dissolve 0.12 gram cupric sulfate in 25 milliliters of water. (1 % w/v)

5.1.20.2.2 Lot number: Eight digit format year/month/day/SA1/initials of preparer. Example: 20101231SA1XXX

5.1.20.3 Concentrated Ammonium Hydroxide (B)

5.1.20.3.1 Prepare a sealed bottle of concentrated ammonium hydroxide, or take an aliquot from a stock bottle for use.

5.1.20.4 Toluene/Carbon Disulfide (C)

5.1.20.4.1 Mix 20 milliliters of toluene with 5 milliliters of carbon disulfide.

5.1.20.5 Application of Procedure on Evidence

5.1.20.5.1 Dissolve a small amount of sample with 2-3 drops of cupric sulfate (A) in a new culture tube.

5.1.20.5.2 Add 2-3 drops of concentrated ammonium hydroxide (B) and then add 2-3 drops of toluene/carbon disulfide (C) and agitate the culture tube.

5.1.20.5.3 Observe any reaction or color produced.

5.1.20.5.4 Record the results in the FA case file if test is being performed for case work or Resource Manager section of FA if test is being performed for quality control purposes.

5.1.20.5.5 QC check: Methamphetamine produces a yellow/brown color in the organic phase after addition of the toluene/carbon disulfide solution.

5.1.20.5.6 Results: Methamphetamine, BZP, and secondary amines – yellow/brown

5.1.21 Simon's Test (Modified Sodium Nitroprusside) (Secondary Amine #2)

5.1.21.1 This color test reacts with secondary amines to produce a blue-violet color.

5.1.21.2 1 % Sodium Nitroprusside/10 % by Volume of Acetaldehyde (A)

5.1.21.2.1 Dissolve 1 gram of sodium nitroprusside in 100 milliliters of water, then discard 10 milliliters of this solution.

5.1.21.2.2 Add 10 milliliters of acetaldehyde to the remaining 90 milliliters of sodium nitroprusside/water.

5.1.21.2.3 The expiration date for this reagent shall be one month after preparation.

5.1.21.2.4 This reagent shall be refrigerated.

5.1.21.2.5 Lot number: Eight digit format year/month/day/SA2/initials of preparer. Example: 20101231SA2XXX

5.1.21.3 2 % Sodium Carbonate (B)

5.1.21.3.1 Dissolve 2 grams of sodium carbonate in 100 milliliters of water.

5.1.21.4 Application of Procedure on Evidence

5.1.21.4.1 Place a small amount of sample in a culture tube or clean spot well and add one drop of Reagent A, then add 2 drops of Reagent B.

5.1.21.4.2 Observe any reaction or color produced.

5.1.21.4.3 Record results in the case file if the test is being performed for case work or Resource Manager of FA if test is being performed for quality control purposes.

5.1.21.4.4 QC check: Methamphetamine produces a blue-violet color.

5.1.21.4.5 Results: Methamphetamine and secondary amines – blue-violet
Amphetamine and primary amines – Negative reaction (light pink is the color of the reagent)

5.1.22 Liebermann's Reagent

5.1.22.1 This color test reacts with methcathinone, analogs of methcathinone, and most of the synthetic cannabinoids with an indole substructure. When a synthetic cannabinoid is present on plant material, an extraction with methylene chloride/acetonitrile shall be conducted prior to performing the color test.

5.1.22.2 Liebermann's Reagent (A)

5.1.22.2.1 SLOWLY add 5 grams of sodium nitrite to 50 milliliters of concentrated sulfuric acid, with stirring. **NOTE: This is an exothermic reaction.**

5.1.22.2.2 Lot number: Eight digit format year/month/day/LB/initials of preparer. Example: 20131231LBXXX

5.1.22.3 Methylene chloride-acetonitrile solution (B)

5.1.22.3.1 Mix equal amounts of methylene chloride and acetonitrile.

5.1.22.4 Application of Procedure on Evidence – Methcathinone and analogs of methcathinone

5.1.22.4.1 See **5.1.7** for all powder samples.

5.1.22.4.2 QC check: 3,4-MDPV turns yellow-green

5.1.22.4.3 Results:

- 3,4-MDMC turns bright orange
- MDMA turns brown

5.1.22.5 Application of Procedure on Evidence – Synthetic cannabinoids present on plant material

5.1.22.5.1 Add a small amount of plant material to test tube (NOT a small culture tube) and cover with Reagent B.

5.1.22.5.2 Shake the test tube and immediately pipette the liquid to a new test tube.

5.1.22.5.3 Add approximately five drops of Reagent A to the liquid extract and mix thoroughly.

5.1.22.5.4 Observe any reaction or color produced.

5.1.22.5.5 QC check: See **5.1.22.4.2**

5.1.22.5.6 Results:

- AM-2201 turns yellow-brown
- JWH-073 and JWH-018 turn yellow-brown
- JWH-122 turns yellow-brown
- JWH-019/JWH-081 turns yellow-brown
- Many synthetic cannabinoids turn yellow/brown/orange colors

5.1.23 Chen-Kao Reagent

5.1.23.1 This color test consists of three components which, when added in order, react with ephedrine and pseudoephedrine to produce a violet color. Per literature, it is important to note that colors may develop slowly and a few milligrams of sample are necessary to produce good color intensity.

5.1.23.2 1% (v./v.) Aqueous acetic acid solution (A)

5.1.23.2.1 Add 1 mL of glacial acetic acid to 100 mL of deionized water. Store in a sealed glass container.

5.1.23.2.2 Lot number: Eight digit format year/month/day/ChenKao/initials of preparer. Example: 20170512ChenKaoXXX. Note: the (A)(B)(C) designations may be noted after the initials of the preparer in the lot name to distinguish each component of this reagent.

5.1.23.3 1% (w./v.) Aqueous copper (II) sulfate solution (B)

5.1.23.3.1 Dissolve 1 gram of copper (II) sulfate in 100 mL deionized water. Store in a sealed glass container.

5.1.23.4 8% (w./v.) Aqueous sodium hydroxide solution (C)

5.1.23.4.1 Dissolve 8 grams of sodium hydroxide in 50 mL of deionized water. Store in a sealed glass container.

5.1.23.5 Application of Procedure on Evidence

5.1.23.5.1 A 1:1:1 ratio of the above listed components A, B, and C shall be maintained in order to achieve proper results.

5.1.23.5.2 Dissolve a small amount of sample with 2-3 drops of 1% aqueous acetic acid (A) in a new culture tube.

5.1.23.5.3 Add 2-3 drops of 1% aqueous copper (II) sulfate solution (B) followed by 2-3 drops of 8% aqueous sodium hydroxide (C) and agitate the culture tube.

5.1.23.5.4 Observe any reaction or color produced.

5.1.23.5.5 Record the results in the FA case file if the test is being performed for casework or the Resource Manager section of FA if test is being conducted for quality control purposes.

5.1.23.5.6 QC check: Pseudoephedrine will produce a violet color upon addition of the final component.

5.1.23.5.7 Results: Pseudoephedrine and ephedrine – violet.

5.1.23.6 Limitations

5.1.23.6.1 For organic liquids, aqueous acid will need to be added to an aliquot of the sample and pH checked to ensure acidic. This aqueous layer shall then be separated from the organic layer and Chen-Kao testing will be performed on the aqueous layer as outlined above.

5.1.23.6.2 For aqueous basic liquids and sludge samples, an aliquot of the sample being tested shall be made acidic (check pH) prior to application of the Chen-Kao reagent as outlined above.

5.2 Sampling - See Drug Chemistry Section Technical Procedure for Sampling.

5.3 Calculations - N/A

5.4 Uncertainty of Measurement - N/A

6.0 Limitations - See specific procedures listed above.

7.0 Safety

7.1 Caution shall be taken when using the hot plate.

7.2 Care shall be taken when working with acids, bases, or other chemicals listed throughout the procedure.

7.3 Refer to Appendix 1 for chemical hygiene and safety precautions.

8.0 References

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9.0 **Records -** Entries in Resource Manager in the FA System

10.0 **Attachments –** Appendix 1

Revision History		
Effective Date	Version Number	Reason
08/19/2020	7	**Remove all references to stock bottles throughout.** **4.2** – Changed "preferred" to "required" for amber bottles for Duquenois reagent. Added "ACS grade or higher". **5.1.1.2** – Added steps to be taken. **5.1.2.1 –** Added "Resource Manager". **5.1.5 –** Added "may be". Removed duplicate labeling information. **5.1.5.1 & 5.1.5.2 -** Removed. **5.1.7** – Reworded. **5.1.8.1** – Changed "amphetamines" to "phenethylamines". **5.1.8.2 –** Removed percent requirement. **5.1.8.6 –** Updated examples. **5.1.9.1 –** Added wording for proper/positive result. **5.1.9.2.1** – Added requirement to refrigerate. **5.1.9.2.2 –** Removed. **5.1.9.6.2** – Added young plant material. **5.1.9.6.3** – Removed wording for heat gun. **5.1.22.2** – Corrected spelling of Liebermann's. **7.0** – Remove reference to Safety Manual, and replace completely with current. **8.0 –** Updated Nakamura reference to include title. **10.0** – Added Appendix 1.

Appendix 1: Chemical Hygiene and Safety Precautions

Acetic Acid, Glacial **DANGER: HIGH RISK SUBSTANCE** *	
	**HEALTH 3** **FLAMMABILITY 2** **REACTIVITY 0**
Detection of Release	Colorless liquid; stinging odor
Signs/Symptoms of Exposure	Severe skin burns and eye damage; respiratory irritation.
PEL	ACGIH TWA – 10 ppm; ACGIH STEL – 15 ppm (Inhalation)
Associated Hazards	Causes severe skin burns and eye damage. Flammable liquid and vapor.
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time 32 minutes)
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Keep away from sources of ignition. Take measures to prevent the build-up of electrostatic charge. Keep in a tightly closed container. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Dispose of in Hazardous Chemical Waste.
Emergency Procedures	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician. **Spills:** Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Small contained spill: wearing appropriate PPE, soak up with inert absorbent material, and place in container. Dispose in Hazardous Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Acetaldehyde

DANGER: PARTICULARLY HAZARDOUS SUBSTANCE

HEALTH	**2**
FLAMMABILITY	**4**
REACTIVITY	**2**

Detection of Release	Pungent odor; clear liquid
Signs/Symptoms of Exposure	Eye irritation; respiratory irritation
PEL	OSHA Table Z-1 TWA 200 ppm or 360 mg/m3
Associated Hazards	Extremely flammable liquid and vapor; Causes serious eye irritation; May cause respiratory irritation; Suspected of causing genetic defects; **May cause cancer**
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time < 1 minute; CHANGE GLOVES OFTEN)
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Keep away from sources of ignition. Take measures to prevent the build-up of electrostatic charge. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Dispose in Hazardous Chemical Waste.
Emergency Procedures	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Wash off with soap and plenty of water. Consult a physician. **Spills:** Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Small spills: Contain spillage, and then soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container. Dispose in Hazardous Chemical Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Ammonium Hydroxide **DANGER: HIGH RISK SUBSTANCE***	
	**HEALTH 3** **FLAMMABILITY 1** **REACTIVITY 0**
Detection of Release	Colorless Liquid; pungent to faint ammonia odor
Signs/Symptoms of Exposure	Severe skin irritation/burns; eye irritation/burns
PEL	ACGIH Threshold Limit Values 25 ppm (TWA); 35 ppm (STEL)
Associated Hazards	Harmful if swallowed. Causes severe skin burns and eye damage.
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time less 240 minutes)
Safe handling, storage, disposal	Avoid contact with skin and eyes. Always open containers slowly to allow any excess pressure to vent. Avoid formation of vapor or mist. Containers which are opened must be carefully resealed and kept upright to prevent leakage. May develop pressure. Refrigerate before opening. Handle and open container with care.
Emergency Procedures	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician. **Spills:** Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Small contained spill: Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. Dispose in Hazardous Chemical Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Carbon Disulfide **DANGER: HIGH RISK SUBSTANCE***	
	**HEALTH 2** **FLAMMABILITY 3** **REACTIVITY 0**
Detection of Release	Strong Odor/Stench
Signs/Symptoms of Exposure	Skin Irritation; serious eye irritation; acute exposure to high concentrations of carbon disulfide may result in rapid onset of both local irritation and concentration-dependent increased severity of neurological symptoms such as nausea, dizziness, headache, delusions, hallucinations, delirium, mania, psychosis, blurred vision, convulsions, and coma.
PEL	OSHA 20 ppm (TWA)/Peak 100 ppm (8 hr shift)
Associated Hazards	Flammable Liquid; Inhalation hazard/respiratory sensitizer; suspected of damaging fertility or the unborn child; skin irritant, chronic damage to organs if inhaled.
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: Fluorinated rubber 0.7 mm thickness (break through time = 480 minutes), nitrile (break through time = 2 minutes)
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist; Use explosion-proof equipment; Keep away from heat and sources of ignition; take measures to prevent the build-up of electrostatic charge. Dispose in Hazardous Chemical Waste.
Emergency Procedures	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. **Inhalation Exposure:** If inhaled, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician. **Spills:** Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Small contained spill: wearing appropriate PPE, collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container. Dispose in Hazardous Chemical Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Cobalt (II) Acetate

DANGER: PARTICULARLY HAZARDOUS SUBSTANCE *

HEALTH	2
FLAMMABILITY	0
REACTIVITY	0

Detection of Release	Solid purple dry chemical
Signs/Symptoms of Exposure	May cause difficulties breathing if inhaled
PEL	ACGIK Threshold Limit Values (TWA) 0.02 mg/m^3
Associated Hazards	Harmful if swallowed; May cause an allergic skin reaction; Causes serious eye irritation; May cause allergy or asthma symptoms or breathing difficulties if inhaled; Suspected of causing genetic defects; **May cause cancer; May damage fertility or the unborn child.**
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat.
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Keep container tightly closed in a dry and well-ventilated place (Hygroscopic). Dispose in Hazardous Chemical Waste.
Emergency Procedures (2.2)(4.1)(6)	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. **Inhalation Exposure:** If inhaled, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Wash off with soap and plenty of water. Consult a physician. **Spills:** Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. Small contained spill: wearing appropriate PPE, Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal. Dispose in Hazardous Chemical Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Ferric Chloride

DANGER: HIGH RISK SUBSTANCE *

HEALTH	**3**
FLAMMABILITY	**0**
REACTIVITY	**0**

Detection of Release	Pungent odor; solid powder
Signs/Symptoms of Exposure	Skin irritation; eye irritation.
PEL	ACGIH Threshold Limit Values (TLV) 1 mg/m^3 (TWA)
Associated Hazards	Harmful if swallowed. Causes skin irritation. Causes serious eye damage.
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: Nitrile (Break though time 480 min.).
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Store under inert gas. Keep container tightly closed in a dry and well-ventilated place (Hygroscopic). Dispose in Hazardous Chemical Waste.
Emergency Procedures (2.2)(4.1)(6)	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. **Inhalation Exposure:** If inhaled, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Wash off with soap and plenty of water. Consult a physician. **Spills:** Use personal protective equipment. Avoid dust formation. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. Small contained spill: wearing appropriate PPE, Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal. Dispose in Hazardous Chemical Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Formaldehyde

DANGER: PARTICULARLY HAZARDOUS SUBSTANCE*

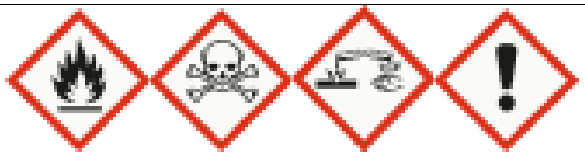
HEALTH	3
FLAMMABILITY	2
REACTIVITY	0

Detection of Release	Spills (colorless); pungent odor.
Signs/Symptoms of Exposure	Skin Corrosion; Eye damage; allergic skin reaction
PEL	NIOSH TWA 0.016 ppm; OSHA PEL 0.75; OSHA STEL 2 ppm
Associated Hazards	OSHA specifically regulated carcinogen; Flammable; Corrosive; Oral, Dermal, Respiratory Acute Toxin; Serious eye damage
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time = 60 minutes)
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Keep away from sources of ignition. Take measures to prevent the buildup of electrostatic charge. Keep container tightly closed in a dry and well-ventilated place. Store in cool dry area. Dispose in Hazardous Waste.
Emergency Procedures	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. **Spills:** Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Small contained spill: wearing appropriate PPE, collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container. Dispose in Hazardous Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Hydrochloric Acid **DANGER: HIGH RISK SUBSTANCE**	
	**HEALTH 3** **FLAMMABILITY 0** **REACTIVITY 1**
Detection of Release	Light yellow liquid; pungent odor
Signs/Symptoms of Exposure	Severe skin burns and eye damage; respiratory irritation
PEL	OSHA Table Z-1: 5 ppm/7 mg/m3
Associated Hazards	Severe skin burns; Severe eye damage; respiratory irritation
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time 16 minutes).
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool dry area. Dispose in Hazardous Waste.
Emergency Procedures	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician. **Spills:** Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Small contained spill: wearing appropriate PPE, soak up with inert absorbent material, and place in container. Dispose in Hazardous Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Isopropylamine

DANGER: HIGH RISK SUBSTANCE *



HEALTH	3
FLAMMABILITY	4
REACTIVITY	0

Detection of Release	Clear liquid; amine-like odor
Signs/Symptoms of Exposure	Skin and eye burns or irritation; respiratory irritation
PEL (8)(Z Tables)	ACGIH Threshold Limit Values (TLV) 5 pmm (TWA)
Associated Hazards	Extremely flammable liquid and vapor. Toxic if swallowed, in contact with skin or if inhaled. Causes severe skin burns and eye damage. Causes serious eye damage. May cause respiratory irritation
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: Fluorinated rubber (break through time 60 minutes); nitrile (break through time > 1 minute- CHANGE GLOVES OFTEN).
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Use explosion-proof equipment. Keep away from sources of ignition. Take measures to prevent the build up of electrostatic charge. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Dispose of in Chemical Hazardous Waste.
Emergency Procedures (2.2)(4.1)(6)	**Eye Contact:** **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. **Spills:** Avoid breathing vapors. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Small spills: Contain spillage, and then soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container. Dispose in Hazardous Chemical Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Methanol

DANGER: HIGH RISK SUBSTANCE *

HEALTH	**2**
FLAMMABILITY	**3**
REACTIVITY	**0**

Detection of Release	Colorless liquid with a sweet, pungent odor.
Signs/Symptoms of Exposure	Headache, Nausea, Dizziness, Eye damage. May cause intoxication that includes central nervous system depression, headache, dizziness, nausea, lack of coordination, and confusion.
PEL	OSHA (TWA) 200 ppm
Associated Hazards	Flammable. Acute oral, dermal, and inhalation toxin. Toxic if swallowed, comes in contact with skin, or inhaled. Specific target organ toxicity of eyes.
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time less than 1minute), butyl-rubber (break through time greater than 8 hours)
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Use explosion-proof equipment. Keep away from sources of ignition. Take measures to prevent the build-up of electrostatic charge. Dispose in Hazardous Chemical Waste. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Emergency Procedures	**Eye Contact:** Flush eyes with water as a precaution. **Inhalation Exposure:** If inhaled, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** After swallowing: fresh air. Make victim drink ethanol (e.g. 1 drinking glass of a 40% alcoholic beverage). Call a doctor immediately (mention methanol ingestion). Only in exceptional cases, if no medical care is available within one hour, induce vomiting (only in fully conscious persons) and make victim drink ethanol again (approx. 0.3 ml of a 40% alcoholic beverage/kg body weight/hour). **Skin Contact:** Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. **Spills:** Avoid breathing vapors, mist, or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Small spills: Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal. Large spills: Turn off sources of heat if possible; evacuate area and call 911 (Haz Mat).

Methylene Chloride / Dichloromethane

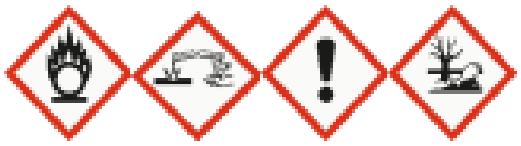
DANGER: PARTICULARLY HAZARDOUS SUBSTANCE *

HEALTH	2
FLAMMABILITY	1
REACTIVITY	1

Detection of Release	Clear colorless liquid. Ether like odor
Signs/Symptoms of Exposure	Serious eye irritation; skin irritation; may cause drowsiness or dizziness.
PEL	ACGIH (TLV) – 50 ppm; OSHA Specifically Regulated Chemicals/Carcinogens – (PEL) 25 ppm
Associated Hazards	Serious eye and skin irritation; suspected of causing cancer
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: Fluorinated rubber (break through time = 148 minutes)
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Keep in a tightly closed container. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Dispose of in Hazardous Chemical Waste.
Emergency Procedures (2.2)(4.1)(6)	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Wash off with soap and plenty of water. Consult a physician. **Spills:** Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Small contained spill: wearing appropriate PPE, collect with absorbent material, and place in container. Dispose in Hazardous Chemical Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Potassium Permanganate

DANGER: HIGH RISK SUBSTANCE *

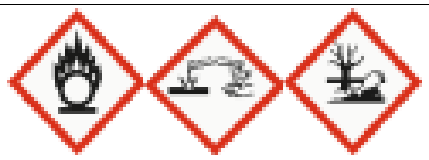


HEALTH	1
FLAMMABILITY	0
REACTIVITY	0

Detection of Release	Dark violet crystal; odorless.
Signs/Symptoms of Exposure	Eye and skin burns
PEL	OSHA Ceiling 5 mg/m^3 (see OSHA Z-Table); ACGIH Threshold Limit Value (TLV) 0.1 mg/m^3
Associated Hazards	May intensify fire; oxidizer. Harmful if swallowed. **Causes severe skin burns and eye damage.** Very toxic to aquatic life with long lasting effects.
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time 480 minutes).
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid inhalation of dusts. Keep away from sources of ignition. Keep container tightly closed in a dry and well-ventilated place. Dispose in Hazardous Waste.
Emergency Procedures (2.2)(4.1)(6)	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Call Poison Control and consult a physician. **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician. **Spills:** Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. Spills: wearing appropriate PPE sweep up and place in container for disposal. Dispose in Hazardous Waste.

Silver Nitrate

DANGER: HIGH RISK SUBSTANCE *



HEALTH	**1**
FLAMMABILITY	**0**
REACTIVITY	**3**

Detection of Release (9.1)	Odorless, colorless solid
Signs/Symptoms of Exposure	Causes skin corrosion and severe eye burns.
PEL (8) (Z Tables)	OSHA TWA 0.01 mg/m^3 (see OSHA Z-1 table)
Associated Hazards (2)	May intensify fire; oxidizer. May be corrosive to metals. Causes severe skin burns and eye damage. Very toxic to aquatic life with long lasting effects.
Controls (8.2)	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time 480 minutes).
Safe handling, storage, disposal (7)(13)	Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Keep away from sources of ignition. Keep container tightly closed in a dry and well-ventilated place. Light sensitive. Dispose in Hazardous Waste.
Emergency Procedures (2.2)(4.1)(6)	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Call Poison Control and consult a physician. **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician. **Spills:** Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. Spills: wearing appropriate PPE sweep up and place in container for disposal. Dispose in Hazardous Waste.

Sodium Hydroxide **DANGER: HIGH RISK SUBSTANCE** *	
	**HEALTH 3** **FLAMMABILITY 0** **REACTIVITY 1**
Detection of Release (9.1)	Odorless white pellets
Signs/Symptoms of Exposure	Upper Respiratory Tract irritation; Eye irritation; Skin irritation
PEL	ACGIH Threshold Limit Values (TLV) 2 mg/m^3
Associated Hazards	Causes severe skin burns and eye damage. May be corrosive to metals.
Controls (8.2)	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time 480 minutes).
Safe handling, storage, disposal (7)(13)	Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Conditions for safe storage, including any incompatibilities. Keep container tightly closed in a dry and well-ventilated place. Keep only in original container. Wash skin thoroughly after handling. Dispose in Hazardous Chemical Waste.
Emergency Procedures (2.2)(4.1)(6)	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Never give anything by mouth to an unconscious person. Rinse mouth with water. Call Poison Control and consult a physician. **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. **Spills:** Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Spills: wearing appropriate PPE sweep up and place in container. Dispose in Hazardous Waste.

Sodium Nitrite

DANGER: PARTICULARLY HAZARDOUS SUBSTANCE*

HEALTH	3
FLAMMABILITY	0
REACTIVITY	2

Detection of Release (9.1)	Odorless, white solid.
Signs/Symptoms of Exposure	Eye irritation
PEL	No occupational exposure limit values
Associated Hazards	**May cause cancer**; Toxic if swallowed; Causes serious eye irritation; May intensify fire; oxidizer; Very toxic to aquatic life.
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time 480 minutes).
Safe handling, storage, disposal (7)(13)	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Keep away from heat. Keep container tightly closed in a dry and well-ventilated place. Dispose in Hazardous Waste.
Emergency Procedures (2.2)(4.1)(6)	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Never give anything by mouth to an unconscious person. Rinse mouth with water. Call Poison Control and consult a physician. **Skin Contact:** Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. **Spills:** Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Spills: wearing appropriate PPE sweep up and place in container. Dispose in Hazardous Waste.

Sulfuric Acid, Concentrated

DANGER: HIGH RISK SUBSTANCE


HEALTH	**3**
FLAMMABILITY	**0**
REACTIVITY	**2**

Detection of Release	Spills; corrosion of metals
Signs/Symptoms of Exposure	Severe skin burns and eye damage
PEL	OSHA Table Z-1 TWA 1 mg/m3
Associated Hazards	Severe skin corrosion; serious eye damage; corrosive to metals
Controls	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Handle with gloves. Wear lab coat. Gloves: nitrile (break through time 30 minutes).
Safe handling, storage, disposal	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Dispose in Hazardous Waste.
Emergency Procedures	**Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital. **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. **Spills:** Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Small contained spill: wearing appropriate PPE, soak up with inert absorbent material, and place in container. Dispose in Hazardous Waste. Large spills: Evacuate area and call 911 (Haz Mat).

Toluene

DANGER: HIGH RISK SUBSTANCE *

HEALTH	**2**
FLAMMABILITY	**3**
REACTIVITY	**0**

Detection of Release (9.1)	Benzene-like odor
Signs/Symptoms of Exposure (2)(4)(8)	Skin irritation. May cause headache, dizziness, ataxia, drowsiness, euphoria, hallucinations, tremors, seizures, and coma if inhaled.
PEL (8)(Z Tables)	OSHA TWA 100 ppm (see Table Z-1); ACGIH Threshold Limit Value (TLV) 20 ppm
Associated Hazards (2)	Highly flammable liquid and vapor. May be fatal if swallowed and enters airways. Causes skin irritation. May cause drowsiness or dizziness. Suspected of damaging fertility or the unborn child. May cause damage to organs (Central nervous system) through prolonged or repeated exposure. Toxic to aquatic life. Harmful to aquatic life with long lasting effects
Controls (8.2)	Use under fume hood. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Use eye protection. Wear lab coat. Handle with gloves- nitrile break though < 1 minute – CHANGE OFTEN; fluorinated rubber break through time 480 minutes.
Safe handling, storage, disposal (7)(13)	Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Keep container tightly closed in a dry and well-ventilated place. Use explosion-proof equipment. Keep away from sources of ignition. Take measures to prevent the build up of electrostatic charge. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Dispose in Hazardous Waste.
Emergency Procedures (2.2)(4.1)(6)	**Eye Contact:** Flush eyes with water as a precaution **Inhalation Exposure:** If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician. **Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. **Skin Contact:** Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. **Spills:** Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Small contained spill: wearing appropriate PPE, soak up with inert absorbent material, and place in container. Dispose in Hazardous Waste. Large spills: Evacuate area and call 911 (Haz Mat).