

Form	Deviation Request Form
Title	DRF - Technical Procedure for Extractions and Separations
Laboratory Location	Lab-wide
Discipline/Section	Drug Chemistry
A. Requested deviation applies to:	Technical Procedure for Extractions and Separations - Version 7
B. Requested deviation:	Add: 5.12.10 Derivatization of Thermally Labile Compounds 5.12.10.1 This procedure may be used on previously extracted samples or on straight samples. 5.12.10.2 If the sample is in solution, evaporate any solvent to dryness in a vial. 5.12.10.3 Dissolve approximately 1 mg of the dried sample in BSTFA. 5.12.10.4 Cap the sample and mix well. 5.12.10.5 Allow any particulate matter to settle and transfer the solution to a new vial to inject on GC-MS. 5.12.10.6 Inject BSTFA as the method blank.
C. Necessity for the deviation:	To add instructions on how to perform derivatization on thermally labile compounds for GC-MS analysis.
D: Technical Review and Authorization	These instructions follow the standard procedure provided with the BSTFA reagent and were confirmed to work through a verification.
Technical Authorization	Yes - Authorized
Technical Authorizer	<input type="checkbox"/> Galassie, Allison
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	<input type="checkbox"/> Schell, Kathleen

Effective Date:

3/1/2024

Version: 3.0

Created at 2/19/2024 10:27 AM by  Galassie, Allison

Last modified at 2/20/2024 8:16 AM by  Schell, Kathleen

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## Technical Procedure for Extractions and Separations

**1.0 Purpose** - This procedure specifies the extraction and separation techniques used to analyze suspected controlled substances in solid dosage form.

**2.0 Scope** - This procedure applies to all separations and extractions performed in the Drug Chemistry Sections of the State Crime Laboratory by Forensic Scientists who analyze solid dosage forms of suspected controlled substances.

**3.0 Definitions** - N/A

### 4.0 Equipment, Materials and Reagents

**4.1 Equipment** – N/A

#### 4.2 Materials

- Fume hood
- Heat source
- Eye protection
- Laboratory coat
- Gloves
- Beaker(s), sample vial(s), or other glass container(s)
- Centrifuge with centrifuge tubes or Vortex mixer
- Filtering apparatus (e.g., filter paper, pipette plugged with glass wool, cotton, or Kim Wipe)
- Funnel
- Glass stirring rod
- Graduated cylinder
- Mortar and pestle (optional)
- Pipettes with bulb
- Reagent or stock bottle(s)
- pH test paper
- Separatory funnel (optional)
- Syringe (disposable with needle)
- Spatula
- Test tube(s)
- Water (deionized)

#### 4.3 Commercial Reagents (ACS Grade or higher)

**4.3.1** Suitable acids, for example:

- Hydrochloric acid (concentrated or dilute)
- Acetic acid (glacial or dilute)

**4.3.2** Suitable organic solvents, for example:

- Acetone
- Ethyl ether
- Chloroform

- Heptane
- Hexane
- Methanol
- Methylene chloride
- Isopropanol

**4.3.3** Suitable bases, for example:

- Sodium hydroxide
- Sodium bicarbonate
- Ammonia/ammonium hydroxide

**4.3.4** Drying agents, (optional) for example:

- Sodium sulfate (anhydrous)
- Magnesium sulfate (anhydrous)

**4.4** Reagents, including commercial reagents removed from the factory container, shall be labeled and stored according to the [Administrative Policy for Drug Chemistry Quality Assurance](#) and the [Laboratory Safety Manual: Chemical Hygiene Plan and Hazardous Communication Program](#).

**5.0 Procedure - Preparing Reagents** - Reagents may be prepared in any amount provided that the component ratios are kept constant. A positive quality control check, consisting of a check with pH paper, shall be performed upon creation for all prepared acidic and basic solvents/reagents. Results of the quality control check for critical solvents/reagents shall be documented in the Forensic Advantage (FA) Resource Manager. Critical solvents/reagents are specified in the procedure below.

**5.1 Ammoniated Solvents (Hexane or Chloroform)**

**5.1.1** Mix 10 milliliters ammonium hydroxide and 100 milliliters hexane (or chloroform) in a stock bottle and shake.

**5.1.2** Allow layers to separate and draw off solvent for use.

**5.1.3** Expiration date for ammoniated solvents shall be three months.

**5.1.4** Containers shall be labeled with name of reagent, lot number and expiration date.

**5.1.4.1** Lot number format: YearMonthDay**AmmonHex**Initials or  
YearMonthDay**AmmonChlor**Initials

**5.1.5** QC Results: Addition of the solvent layer from Ammoniated Hexane or Ammoniated Chloroform will cause the pH paper to give a basic indication. Results of this QC check shall be documented in the FA Resource Manager, as this is deemed a critical solvent/reagent.

**5.2 0.6 N Hydrochloric Acid**

**5.2.1** Carefully add 5 milliliters of concentrated hydrochloric acid to 95 milliliters of water. (SAFETY NOTE: Always add the acid to the water.)

**5.2.2** QC Results: Addition of reagent will cause the pH paper to give an acidic indication.

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**5.3 Ethyl Ether saturated with Hydrochloric Acid Reagent**

- 5.3.1 Mix ethyl ether and concentrated hydrochloric acid in a test tube or other glass container in an approximate 1:5 (HCl:Ethyl ether) ratio.
- 5.3.2 Gently shake to mix the layers.
- 5.3.3 Allow layers to separate then remove ethyl ether for use.
- 5.3.4 Prepare fresh as needed.
- 5.3.5 QC Results: Addition of reagent will cause the pH paper to give an acidic indication.

**5.4 Concentrated Sodium Hydroxide**

- 5.4.1 Add desired amount of water to a beaker or other glass container.
- 5.4.2 Add sodium hydroxide pellets with stirring until solution is saturated (i.e., no more pellets will dissolve).
- 5.4.3 QC Results: Addition of reagent will cause the pH paper to give a basic indication.

**5.5 5 % Sodium Hydroxide**

- 5.5.1 Dissolve 5 grams of sodium hydroxide pellets in 100 milliliters of water, with stirring.
- 5.5.2 QC Results: Addition of reagent will cause the pH paper to give a basic indication.

**5.6 20 % Sodium Hydroxide**

- 5.6.1 Dissolve 20 grams of sodium hydroxide pellets in 100 milliliters of water, with stirring.
- 5.6.2 QC Results: Addition of reagent will cause the pH paper to give a basic indication.

**5.7 5 % Sulfuric Acid**

- 5.7.1 Carefully add 5 milliliters of sulfuric acid to 95 milliliters of water, with stirring.
- 5.7.2 QC Results: Addition of reagent will cause the pH paper to give an acidic indication.

**5.8 3:1 Chloroform:Isopropyl Alcohol Reagent**

- 5.8.1 Mix 60 milliliters of chloroform and 20 milliliters isopropyl alcohol in a glass container. (Approximate 3:1 chloroform:isopropyl alcohol ratio.)
- 5.8.2 Gently shake to mix the layers before each use.

**5.9 Potassium Permanganate**

- 5.9.1 See [Drug Chemistry Section Technical Procedure for Preliminary Color Tests](#) for preparation instructions.

## 5.10 0.05N HCl Solution

**5.10.1** Concentrated hydrochloric acid is 12 N. Use a ratio of 1mL concentrated hydrochloric acid to 250 mL water to obtain a 0.05 N HCl solution. Add water to the storage container before carefully adding the acid. Mix well.

**5.10.2** QC Results: Addition of reagent will cause the pH paper to give an acidic indication.

## 5.11 Expiration date

**5.11.1** There is no expiration date for the solvents and reagents listed in this procedure, unless otherwise indicated. Additional positive quality control rechecks may be performed at the discretion of the analyst to ensure reagent reliability.

## 5.12 Application of Procedures on Evidence

### 5.12.1 Extraction of Organic Acids and Bases

**5.12.1.1** This procedure shall be used to isolate and purify acidic and basic compounds for further analysis. The chemical properties of the organic acid or base being extracted, and the properties of other substances mixed with the sample will determine which acids, bases, and solvents shall be used.

**5.12.1.2** Dissolve the sample in 0.6 N hydrochloric acid or other suitable acid.

**5.12.1.2.1** Check the pH of the solution with test paper to ensure the solution is acidic.

**5.12.1.3** Extract the acid solution with a suitable organic solvent.

**5.12.1.4** If an organic base is the compound of interest, discard the solvent washings.

**5.12.1.5** If acidic drugs such as barbiturates or common diluents are compounds of interest, retain the solvent washings and evaporate for further analysis.

**5.12.1.6** Make the acidic solution basic by adding a suitable base.

**5.12.1.6.1** Check the pH of the solution with test paper to ensure the solution is basic.

**5.12.1.7** Extract the basic solution with a suitable organic solvent.

**5.12.1.8** If the organic base being extracted is not volatile, evaporate the solvent under the hood, leaving the extracted organic base.

**5.12.1.8.1** The solvent may also be used for Gas Chromatograph-Mass Spectrometry (GC-MS) analysis if approved for use on the GC-MS instrument.

**5.12.1.9** If the organic base is volatile (e.g., phenethylamines), or if the salt form of the organic base is desired, add the ethyl ether saturated with hydrochloric acid reagent drop wise until precipitation is complete.

- 5.12.1.10** Evaporate the solvent under the hood and/or filter to isolate the organic salt.
- 5.12.1.10.1** Organic solvent extracts may be dried using magnesium sulfate, sodium sulfate, or other drying agent.
- 5.12.1.10.2** Re-crystallization with an organic solvent, such as ethyl ether or methanol may be performed.
- 5.12.1.11** The acid solvent washing (**5.12.1.3**) may also be retained and combined with the base solvent washings (**5.12.1.7**) for GC-MS analysis if the solvent is approved for use on the GC-MS instrument.
- 5.12.1.12** Note: The extractions may be performed using separatory funnels, test tubes, glass sample vials, beakers, or reaction vessels collected from crime scenes.
- 5.12.1.13** Suggested uses:
- 5.12.1.13.1** Cold concentrated sodium hydroxide made to a paste and ethyl ether may be used to extract propoxyphene from pharmaceutical preparations of acetaminophen.
- 5.12.1.13.2** Sodium bicarbonate and chloroform may be used to extract LSD.
- 5.12.1.13.3** Cocaine HCl and nicotinamide may be separated by adding sodium hydroxide to an aqueous solution, decant aqueous. Wash solid material with water, extract with ethyl ether and evaporate the ether.

## **5.12.2 Dry Solvent Extractions of Drugs Using Ammoniated Solvents**

- 5.12.2.1** This procedure is used to remove a variety of drugs from pharmaceutical preparations and clandestine mixtures.
- 5.12.2.2** Place a small amount of sample in filtering apparatus over a small beaker and wash with ethyl ether.
- 5.12.2.3** Discard washings.
- 5.12.2.4** Allow sample to air dry briefly, and wash with several small portions of the ammoniated solvent.
- 5.12.2.5** Evaporate solvent over moderate heat in a fume hood.
- 5.12.2.6** Note: The ammoniated solvent shall NOT be used directly for GC-MS analysis.
- 5.12.2.7** Suggested uses for ammoniated hexane:
- 5.12.2.7.1** Common diluents (e.g., caffeine, diltiazem, levamisole) may be removed from cocaine base.

5.12.2.7.2 Organic bases may be removed from acetaminophen and nicotinamide.

5.12.2.7.3 Basic drugs (e.g., opiates, diethylpropion, and diazepam) may be removed from pharmaceutical and clandestine preparations.

5.12.2.7.4 Phenethylamines (e.g., methamphetamine, etc.) may be removed from commercial and clandestine preparations, but volatile extracts shall be converted back to acidic pH with acidic ether before being evaporated.

5.12.2.8 Suggested uses for ammoniated chloroform:

5.12.2.8.1 Hydromorphone, morphine, diazepam, lorazepam, flurazepam, phentermine, chlordiazepoxide, cocaine, pentazocine, methaqualone, benzodiazepines from pharmaceutical and clandestine preparations.

### 5.12.3 Separation of Organic Acids and Bases by Solvent Wash

5.12.3.1 This procedure uses the solubility differences between organic acids, bases, and diluent materials to separate the desired components for further analysis.

5.12.3.2 Place a small amount of sample in filtering apparatus over a small beaker or other glass container.

5.12.3.3 Wash sample with several small portions of suitable solvent.

5.12.3.4 Evaporate solvent over heat source in a fume hood to yield compounds.

5.12.3.5 Note: This procedure may be carried out in glass beakers or vials when a “backwash” is needed to help purify an extracted material.

5.12.3.6 Suggested uses:

5.12.3.6.1 Sample preparation for FT-IR analysis:

- Diazepam may be removed from commercial preparations with acetone or ethyl ether washes.
- Methylphenidate may be removed from commercial preparations with chloroform washes.

5.12.3.6.2 Common diluents (mannitol, inositol) may be removed from cocaine hydrochloride with chloroform washes. The cocaine remains in the chloroform wash.

5.12.3.6.3 Lidocaine HCl may be removed from cocaine HCl with acetone washes. The cocaine HCl remains in the filtering apparatus and the lidocaine remains in the acetone wash.

5.12.3.6.4 Methamphetamine/dimethylsulfone mixtures may be separated with successive and multiple washes of ethyl ether, acetone, and

chloroform. The methamphetamine remains in the chloroform wash and the dimethylsulfone remains in the acetone wash.

**5.12.3.6.5** Clorazepate may be removed from commercial preparations using chloroform:methanol (3:1) followed by subsequent chloroform washes.

**5.12.3.6.6** Sample preparation for GC-MS analysis:

**5.12.3.6.6.1** Alprazolam, lorazepam, diazepam, etc.: Add several drops of solvent to a tablet (intact or crushed). Allow the tablet to soak for a short time. Transfer the solvent through a filter to a sample vial or insert and add more solvent for analysis.

**5.12.3.6.6.2** Coated tablets: Remove coating before adding several drops of solvent to the remaining intact tablet, prepare as described above. Pharmaceutical tablets may be extracted to remove large amounts of acetaminophen or aspirin prior to running on the GC-MS.

**5.12.3.6.6.3** Sulfates may need to be extracted/converted before they are analyzed via GC-MS.

**5.12.3.6.6.4** Syringes: Wash with methanol and extract if necessary. (If excessive quantities of blood or other liquids are present in a syringe, an extraction is required).

**5.12.3.6.6.5** Sugar cubes or blotter with LSD may be washed with methanol to obtain samples for color tests. Sugar cubes or blotter may then be soaked in methanol overnight in the refrigerator and then analyzed via GC-MS.

**5.12.4** **Extraction of Psilocybe Mushrooms - Using Acetic Acid:**

**5.12.4.1** Break up approximately 1-2 grams of psilocybe mushrooms and place in a small beaker.

**5.12.4.2** Add enough deionized water to moisten the sample.

**5.12.4.3** Add 1-2 milliliters of glacial acetic acid.

**5.12.4.4** Check with pH test paper to ensure solution is acidic.

**5.12.4.5** Stir 1-2 minutes. (DO NOT leave in acidic solution for extended period of time.)

**5.12.4.6** Decant liquid to large test tube.

- 5.12.4.7 Carefully add concentrated ammonium hydroxide drop-wise until a pH of 8 is obtained.
- 5.12.4.8 Gently extract with ethyl ether or 3:1 chloroform/isopropyl alcohol reagent.
- 5.12.4.9 Solvent may be dried using magnesium sulfate or sodium sulfate.
- 5.12.4.10 Evaporate under nitrogen or air flow with NO HEAT.
- 5.12.4.11 Reconstitute precipitate in chloroform or methanol to inject on GC-MS.

**5.12.5 Extraction of Psilocybe Mushrooms - Using Sodium Bicarbonate:**

- 5.12.5.1 Break up approximately 1-2 grams of psilocybe mushrooms and place in a small beaker.
- 5.12.5.2 Add water and sodium bicarbonate (approximately 10 grams) until an off-white paste forms.
- 5.12.5.3 Check with pH test paper to ensure solution is weakly basic or a pH of 8 is obtained.
- 5.12.5.4 Add ethyl ether and stir.
- 5.12.5.5 Decant off ethyl ether.
- 5.12.5.6 Solvent may be dried using magnesium sulfate or sodium sulfate.
- 5.12.5.7 Evaporate solvent under nitrogen or air flow with NO HEAT.
- 5.12.5.8 Reconstitute precipitate in chloroform or methanol to inject on GC-MS.

**5.12.6 Extraction of Anabolic Steroids from Vegetable Oils**

- 5.12.6.1 This procedure is used to isolate anabolic steroids from various vegetable oil preparations.
- 5.12.6.2 Withdraw 1 milliliter of oil from multi-injection sample vial and transfer the oil to a centrifuge tube or test tube. A disposable syringe or pipette shall be used to transfer the oil.
- 5.12.6.3 Add 2 milliliters of heptane or hexane and mix well.
- 5.12.6.4 Add 1 milliliter of methanol and mix well.
- 5.12.6.5 Allow layers to separate.
- 5.12.6.6 Transfer the methanol layer to a GC-MS vial or evaporate methanol with a heat source to dryness for further analysis.

**5.12.7 Separation of Cocaine Base and Diluents Utilizing Hexane/Water**

- 5.12.7.1** This procedure is used to separate procaine base, benzocaine base, levamisole, and other hexane insoluble compounds.
- 5.12.7.2** Crush a portion of the sample and place in a test tube.
- 5.12.7.2.1** The size of the portion used will be dictated by the ratio of the diluents(s) to cocaine base present in the sample. Suggested 20-30 milligrams if available.
- 5.12.7.3** Add approximately 2 milliliters of hexane to the test tube. Vortex or agitate test tube as needed.
- 5.12.7.4** Add approximately 10 milliliters water to hexane. (Fill rest of test tube.) Vortex or agitate test tube as needed.
- 5.12.7.5** Remove hexane layer and evaporate hexane over moderate heat to obtain sample.
- 5.12.7.5.1** A drying agent such as sodium sulfate may be used prior to evaporating hexane.
- 5.12.7.5.2** If a large amount of diluent is present in the sample, additional washings of hexane may be performed prior to evaporation. Remove the hexane layer to a new test tube and add additional aliquots of water. Repeat until diluent is removed.
- 5.12.7.6** Note: Keep top of test tubes pointed away from face or covered while vortexing to avoid splashing in eyes or face.
- 5.12.7.7** If an infrared of the diluents is desired, extract the water solution with approximately 25 milliliters of methylene chloride. Sodium sulfate or other drying agent may be used if needed.

**5.12.8 Separation of Cocaine Base Utilizing Potassium Permanganate**

- 5.12.8.1** This procedure is used to remove cinnamoyl cocaines, nicotinamide, procaine, caffeine, stearic acid, sodium bicarbonate, sodium borate, and “field test blue.”
- 5.12.8.2** Note: This procedure is less efficient at removing anhydroecgonine methyl ester and will not remove methylbenzoate which appear similar to cinnamoyl cocaines by infrared analysis.
- 5.12.8.3** Crush a small portion of the sample (approximately 30 mg) and place in a test tube.
- 5.12.8.4** Add 3 milliliters of hexane and vortex approximately 30 seconds.
- 5.12.8.5** Add 1 milliliter of potassium permanganate reagent and vortex 1 minute.
- 5.12.8.6** Squirt approximately 10 milliliters of deionized water through the mixture.

5.12.8.7 Allow layers to separate.

5.12.8.8 Remove hexane layer and evaporate over moderate heat.

5.12.8.9 Note: Keep top of test tubes pointed away from face or covered while vortexing to avoid splashing in eyes or face.

#### 5.12.9 Extraction of cannabinoid containing exhibits

5.12.9.1 For oils, the sample amount should not exceed approximately 100 milligrams. For samples in other matrices, including gummies, candies, edibles, etc., the sample amount should not exceed approximately 300 milligrams.

5.12.9.2 Follow the procedure above for the Extraction of Organic Acids and Bases, as listed in 5.12.1. Care should be taken during extractions to ensure solutions are not made overly acidic during extraction or left to sit for extended periods of time.

5.12.9.3 The acid and base solvent portions may be combined for GC-MS analysis.

5.13 **Sampling** - See [Drug Chemistry Section Technical Procedure for Sampling](#).

5.14 **Calculations** – N/A

5.15 **Uncertainty of Measurement** – N/A

6.0 **Limitations** – See individual 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** – FA case file notes


**10.0 Attachments** – Appendix 1.


Revision History		
Effective Date	Version Number	Reason
08/19/2020	7	<p><b>4.2</b> – Change filter paper to “filtering apparatus”, and update throughout procedure (5.12.2.2, 5.12.3.2, and 5.12.3.6.3).</p> <p><b>4.3</b> – Added requirement for ACS grade or higher.</p> <p><b>4.3.1 - 4.3.4</b> – Add “s,”.</p> <p><b>Old 5.1 becomes 4.4; Old 5.2 combined with new 4.4</b> - added “removed from the factory container”.</p> <p><b>5.0</b> - Added requirement for QC of acidic/basic solvents/reagents; documentation for “critical” solvent/reagents.</p> <p><b>5.1.4.1</b> – Added “lot number”.</p> <p><b>5.1.5, 5.2.2, 5.3.5, 5.4.3, 5.5.2, 5.6.2, 5.7.2</b> – Add QC check &amp; result.</p> <p><b>New 5.10</b> – Added.</p> <p><b>5.11.1</b> – Added “listed in this procedure”; added additional quality control rechecks at analyst discretion.</p> <p><b>5.12.1.11</b> - New.</p> <p><b>Old 5.13.1.7.1 (new 5.12.1.8.1)</b> – Change “in” to “on”.</p> <p><b>Old 5.13.1.8.1</b> – Removed.</p> <p><b>New 5.12.1.11</b> – Added.</p> <p><b>5.12.3.6.6.2</b> – Change “shall” to “may”.</p> <p><b>5.12.6.2</b> – Make use of disposable syringe optional for transfer.</p> <p><b>5.12.6.5 &amp; 5.12.6.6</b> – Reworded.</p> <p><b>Old 5.13.7 (New 5.12.7)</b> – Combine and reword.</p> <p><b>5.12.9</b> – Added.</p> <p><b>7.0</b> - Remove reference to Safety Manual, and replace completely with current.</p> <p><b>10.0</b> – Added Appendix 1.</p>



Appendix 1: Chemical Hygiene and Safety Precautions


<b>Acetic Acid, Glacial</b> <b>DANGER: HIGH RISK SUBSTANCE *</b>							
 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #0056b3; color: white; text-align: center;"><b>HEALTH</b></td> <td style="text-align: center;"><b>3</b></td> </tr> <tr> <td style="background-color: #ff0000; color: white; text-align: center;"><b>FLAMMABILITY</b></td> <td style="text-align: center;"><b>2</b></td> </tr> <tr> <td style="background-color: #ffff00; text-align: center;"><b>REACTIVITY</b></td> <td style="text-align: center;"><b>0</b></td> </tr> </table>	<b>HEALTH</b>	<b>3</b>	<b>FLAMMABILITY</b>	<b>2</b>	<b>REACTIVITY</b>	<b>0</b>
<b>HEALTH</b>	<b>3</b>						
<b>FLAMMABILITY</b>	<b>2</b>						
<b>REACTIVITY</b>	<b>0</b>						
<b>Detection of Release</b>	Colorless liquid; stinging odor						
<b>Signs/Symptoms of Exposure</b>	Severe skin burns and eye damage; respiratory irritation.						
<b>PEL</b>	ACGIH TWA – 10 ppm; ACGIH STEL – 15 ppm (Inhalation)						
<b>Associated Hazards</b>	Causes severe skin burns and eye damage. Flammable liquid and vapor.						
<b>Controls</b>	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)						
<b>Safe handling, storage, disposal</b>	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.						
<b>Emergency Procedures</b>	<p><b>Eye Contact:</b> Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.</p> <p><b>Inhalation Exposure:</b> If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.</p> <p><b>Ingestion:</b> Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.</p> <p><b>Skin Contact:</b> Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.</p> <p><b>Spills:</b> 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).</p>						


<b>Ammonium Hydroxide</b> <b>DANGER: HIGH RISK SUBSTANCE*</b>							
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<b>HEALTH</b>	<b>3</b>						
<b>FLAMMABILITY</b>	<b>1</b>						
<b>REACTIVITY</b>	<b>0</b>						
<b>Detection of Release</b>	Colorless Liquid; pungent to faint ammonia odor						
<b>Signs/Symptoms of Exposure</b>	Severe skin irritation/burns; eye irritation/burns						
<b>PEL</b>	ACGIH Threshold Limit Values 25 ppm (TWA); 35 ppm (STEL)						
<b>Associated Hazards</b>	Harmful if swallowed. Causes severe skin burns and eye damage.						
<b>Controls</b>	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)						
<b>Safe handling, storage, disposal</b>	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.						
<b>Emergency Procedures</b>	<p><b><u>Eye Contact:</u></b> Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.</p> <p><b><u>Inhalation Exposure:</u></b> If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.</p> <p><b><u>Ingestion:</u></b> Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.</p> <p><b><u>Skin Contact:</u></b> Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.</p> <p><b><u>Spills:</u></b> 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).</p>						


<b>Heptane</b> <b>DANGER: HIGH RISK SUBSTANCE *</b>							
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<b>HEALTH</b>	<b>1</b>						
<b>FLAMMABILITY</b>	<b>3</b>						
<b>REACTIVITY</b>	<b>0</b>						
<b>Detection of Release</b>	Colorless liquid with a gasoline-like odor.						
<b>Signs/Symptoms of Exposure</b>	Headache, lightheadedness, dizziness, lack of coordination and loss of consciousness. Loss of appetite and/or nausea may occur. Repeated exposure may cause skin rash, dryness and redness.						
<b>PEL</b>	NIOSH Recommended Exposure Limits: TWA 85 ppm; Ceiling 440 ppm.						
<b>Associated Hazards</b>	Highly flammable liquid and vapor. <b>May be fatal if swallowed and enters airways.</b> Causes skin irritation. May cause drowsiness or dizziness. Very toxic to aquatic life with long lasting effects.						
<b>Controls</b>	Use under with proper ventilation. 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 65 minutes)						
<b>Safe handling, storage, disposal</b>	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. Store under inert gas. 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 Hazardous Chemical Waste.						
<b>Emergency Procedures (2.2)(4.1)(6)</b>	<p><b><u>Eye Contact:</u></b> Flush eyes with water as a precaution.</p> <p><b><u>Inhalation Exposure:</u></b> Remove to fresh air. If not breathing, give artificial respiration. Consult a physician.</p> <p><b><u>Ingestion:</u></b> If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.</p> <p><b><u>Skin Contact:</u></b> Wash off with soap and plenty of water. Consult a physician.</p> <p><b><u>Spills:</u></b> 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 collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal. Large Spills: Evacuate area and call 911 (Haz Mat).</p>						


<b>Hexane</b> <b>DANGER: HIGH RISK SUBSTANCE *</b>							
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<b>FLAMMABILITY</b>	<b>3</b>						
<b>REACTIVITY</b>	<b>0</b>						
<b>Detection of Release</b>	Colorless liquid with a gasoline-like odor.						
<b>Signs/Symptoms of Exposure</b>	Headache, lightheadedness, dizziness, lack of coordination and loss of consciousness. Loss of appetite and/or nausea may occur. Acute exposure may cause dermatitis and irritation to the eyes and throat.						
<b>PEL</b>	ACGIH Threshold Limit Values (TLV) 50 ppm						
<b>Associated Hazards</b>	Highly flammable liquid and vapor. <b>May be fatal if swallowed and enters airways.</b> Causes skin irritation. May cause drowsiness or dizziness. Suspected of damaging fertility or the unborn child. May cause damage to organs (Nervous system) through prolonged or repeated exposure if inhaled. Very toxic to aquatic life with long lasting effects.						
<b>Controls</b>	Use under with proper ventilation. 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 59 minutes)						
<b>Safe handling, storage, disposal</b>	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. Store under inert gas. 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 Hazardous Chemical Waste.						
<b>Emergency Procedures</b>	<p><b><u>Eye Contact:</u></b> Flush eyes with water as a precaution.</p> <p><b><u>Inhalation Exposure:</u></b> Remove to fresh air. If not breathing, give artificial respiration. Consult a physician.</p> <p><b><u>Ingestion:</u></b> If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.</p> <p><b><u>Skin Contact:</u></b> Wash off with soap and plenty of water. Consult a physician.</p> <p><b><u>Spills:</u></b> 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 collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal. Large Spills: Evacuate area and call 911 (Haz Mat).</p>						


<b>Hydrochloric Acid</b>							
<b>DANGER: HIGH RISK SUBSTANCE</b>							
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<b>HEALTH</b>	<b>3</b>						
<b>FLAMMABILITY</b>	<b>0</b>						
<b>REACTIVITY</b>	<b>1</b>						
<b>Detection of Release</b>	Light yellow liquid; pungent odor						
<b>Signs/Symptoms of Exposure</b>	Severe skin burns and eye damage; respiratory irritation						
<b>PEL</b>	OSHA Table Z-1: 5 ppm/7 mg/m <sup>3</sup>						
<b>Associated Hazards</b>	Severe skin burns; Severe eye damage; respiratory irritation						
<b>Controls</b>	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).						
<b>Safe handling, storage, disposal</b>	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.						
<b>Emergency Procedures</b>	<p><b><u>Eye Contact:</u></b> Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.</p> <p><b><u>Inhalation Exposure:</u></b> If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.</p> <p><b><u>Ingestion:</u></b> Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.</p> <p><b><u>Skin Contact:</u></b> Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.</p> <p><b><u>Spills:</u></b> 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).</p>						

<b>Methanol</b>							
<b>DANGER: HIGH RISK SUBSTANCE *</b>							
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<b>FLAMMABILITY</b>	<b>3</b>						
<b>REACTIVITY</b>	<b>0</b>						
<b>Detection of Release</b>	Colorless liquid with a sweet, pungent odor.						
<b>Signs/Symptoms of Exposure</b>	Headache, Nausea, Dizziness, Eye damage. May cause intoxication that includes central nervous system depression, headache, dizziness, nausea, lack of coordination, and confusion.						
<b>PEL</b>	OSHA (TWA) 200 ppm						
<b>Associated Hazards</b>	Flammable. Acute oral, dermal, and inhalation toxin. Toxic if swallowed, comes in contact with skin, or inhaled. Specific target organ toxicity of eyes.						
<b>Controls</b>	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 1 minute), butyl-rubber (break through time greater than 8 hours)						
<b>Safe handling, storage, disposal</b>	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.						
<b>Emergency Procedures</b>	<p><b><u>Eye Contact:</u></b> Flush eyes with water as a precaution.</p> <p><b><u>Inhalation Exposure:</u></b> If inhaled, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.</p> <p><b><u>Ingestion:</u></b> 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).</p> <p><b><u>Skin Contact:</u></b> Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.</p> <p><b><u>Spills:</u></b> 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).</p>						

<b>Methylene Chloride/Dichloromethane</b> <b>DANGER: PARTICULARLY HAZARDOUS SUBSTANCE*</b>							
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<b>HEALTH</b>	<b>2</b>						
<b>FLAMMABILITY</b>	<b>1</b>						
<b>REACTIVITY</b>	<b>1</b>						
<b>Detection of Release</b>	Clear colorless liquid. Ether like odor						
<b>Signs/Symptoms of Exposure</b>	Serious eye irritation; skin irritation; may cause drowsiness or dizziness.						
<b>PEL</b>	ACGIH (TLV) – 50 ppm; OSHA Specifically Regulated Chemicals/Carcinogens – (PEL) 25 ppm						
<b>Associated Hazards</b>	Serious eye and skin irritation; suspected of causing cancer						
<b>Controls</b>	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)						
<b>Safe handling, storage, disposal</b>	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.						
<b>Emergency Procedures (2.2)(4.1)(6)</b>	<p><b><u>Eye Contact:</u></b> Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.</p> <p><b><u>Inhalation Exposure:</u></b> If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.</p> <p><b><u>Ingestion:</u></b> Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.</p> <p><b><u>Skin Contact:</u></b> Wash off with soap and plenty of water. Consult a physician.</p> <p><b><u>Spills:</u></b> 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).</p>						

<b>Potassium Permanganate</b> <b>DANGER: HIGH RISK SUBSTANCE *</b>							
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<b>HEALTH</b>	<b>1</b>						
<b>FLAMMABILITY</b>	<b>0</b>						
<b>REACTIVITY</b>	<b>0</b>						
<b>Detection of Release</b>	Dark violet crystal; odorless.						
<b>Signs/Symptoms of Exposure</b>	Eye and skin burns						
<b>PEL</b>	OSHA Ceiling 5 mg/m <sup>3</sup> (see OSHA Z-Table); ACGIH Threshold Limit Value (TLV) 0.1 mg/m <sup>3</sup>						
<b>Associated Hazards</b>	May intensify fire; oxidizer. Harmful if swallowed. <b>Causes severe skin burns and eye damage.</b> Very toxic to aquatic life with long lasting effects.						
<b>Controls</b>	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).						
<b>Safe handling, storage, disposal</b>	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.						
<b>Emergency Procedures (2.2)(4.1)(6)</b>	<p><b><u>Eye Contact:</u></b> Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.</p> <p><b><u>Inhalation Exposure:</u></b> If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.</p> <p><b><u>Ingestion:</u></b> Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Call Poison Control and consult a physician.</p> <p><b><u>Skin Contact:</u></b> Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.</p> <p><b><u>Spills:</u></b> 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.</p>						

<b>Sodium Hydroxide</b>							
<b>DANGER: HIGH RISK SUBSTANCE *</b>							
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<b>HEALTH</b>	<b>3</b>						
<b>FLAMMABILITY</b>	<b>0</b>						
<b>REACTIVITY</b>	<b>1</b>						
<b>Detection of Release (9.1)</b>	Odorless white pellets						
<b>Signs/Symptoms of Exposure</b>	Upper Respiratory Tract irritation; Eye irritation; Skin irritation						
<b>PEL</b>	ACGIH Threshold Limit Values (TLV) 2 mg/m <sup>3</sup>						
<b>Associated Hazards</b>	Causes severe skin burns and eye damage. May be corrosive to metals.						
<b>Controls (8.2)</b>	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).						
<b>Safe handling, storage, disposal (7)(13)</b>	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						
<b>Emergency Procedures (2.2)(4.1)(6)</b>	<p><b><u>Eye Contact:</u></b> Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.</p> <p><b><u>Inhalation Exposure:</u></b> If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.</p> <p><b><u>Ingestion:</u></b> Never give anything by mouth to an unconscious person. Rinse mouth with water. Call Poison Control and consult a physician.</p> <p><b><u>Skin Contact:</u></b> Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.</p> <p><b><u>Spills:</u></b> 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.</p>						

<b>Sulfuric Acid, Concentrated</b> <b>DANGER: HIGH RISK SUBSTANCE</b>							
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<b>FLAMMABILITY</b>	<b>0</b>						
<b>REACTIVITY</b>	<b>2</b>						
<b>Detection of Release</b>	Spills; corrosion of metals						
<b>Signs/Symptoms of Exposure</b>	Severe skin burns and eye damage						
<b>PEL</b>	OSHA Table Z-1 TWA 1 mg/m <sup>3</sup>						
<b>Associated Hazards</b>	Severe skin corrosion; serious eye damage; corrosive to metals						
<b>Controls</b>	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).						
<b>Safe handling, storage, disposal</b>	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.						
<b>Emergency Procedures</b>	<p><b><u>Eye Contact:</u></b> Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.</p> <p><b><u>Inhalation Exposure:</u></b> If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.</p> <p><b><u>Ingestion:</u></b> Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.</p> <p><b><u>Skin Contact:</u></b> Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.</p> <p><b><u>Spills:</u></b> 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).</p>						