Chemistry Overview

The primary function of the Chemistry discipline is to perform chemical testing of compounds for identification to see if they are in violation of state or federal drug laws. This section is also responsible for the analysis of evidence collected from fire scenes. The discipline provides information for ongoing investigative needs, supplies the courts and other state agencies with factual drug information, and in conjunction of the Office of Public Affairs, provides information about drug abuse and trends.

Drug Identification

The section's primary responsibilities include:

-Identification of substances (pills, powder, liquid, etc) submitted by law enforcement

-Purity determination of cocaine, methamphetamine, and THC when required

Note: GBI has established protocols to determine THC purity of oils/vapes and of leafy material. GBI does not have the ability to determine THC content of solid samples such as creams or waxes.

-Incineration of drug evidence as requested by law enforcement

Reports include agency specific information such as case numbers and subjects. They also include weights/volumes of samples submitted, when applicable, identity of compounds and associated schedule if applicable, and the analytical procedures used during testing.

The identification of controlled substances is accomplished by establishing two points of scientific comparison. The analytical examinations may include:

- Thin Layer Chromatography
- Logo Identification of pharmaceutically-prepared tablets and capsules

- Ultraviolet Spectroscopy
- High Performance Liquid Chromatography
- Infrared Spectroscopy
- Gas Chromatography/Mass Spectrometry
- Gas Chromatography/Infrared Spectroscopy

Fire Debris

Fire Debris Analysis is a specialized service within the Chemistry discipline. This analysis provides law enforcement and fire investigators with information concerning the possible use of ignitable liquids at a fire scene. All fire debris analysis is conducted within the Western Regional Lab located in Columbus. The information developed from this analysis may aid a fire investigator in determining whether a fire started due to an accelerant or was ignited by accidental causes.

At a fire scene, a fire investigator will select and take an evidence sample of debris, carpet, wood, etc., and package it into an airtight container such as a sealed mason jar or metal can. The evidence is then submitted to the crime lab where it is assigned a unique DOFS case number and barcode.

The evidence undergoes an extraction procedure to collect any volatile components that may be present in the fire debris sample.

The extracted sample is analyzed on a Gas Chromatograph Mass Spectrometer (GCMS).

Clandestine Laboratory Analysis

The GBI Crime Lab does not respond to clandestine laboratory sites, but can provide chemical testing of items collected at such scenes.

Anhydrous ammonia is often stored improperly in propane cylinders like the one pictured to the right. These can become dangerous as the ammonia will slowly eat away the brass fittings, eventually rupturing the tank. Anhydrous ammonia causes severe irritation to the eyes, nose, throat, and skin. In large enough doses, it can prove fatal.

Biphasic liquids are often found at clandestine lab sites. Commonly, the top layer is an organic liquid while the bottom layer is a basic aqueous solution.

Marijuana/Hemp Analysis

Beginning in September 2019, GBI labs will receive leafy material evidence seized after 5/10/2019 for testing. The testing will include quantitation of delta-9-tetrahydracannanbinol (THC), when appropriate, allowing for the differentiation of marijuana and hemp. Only felony cases will be tested. Examples include, but are not limited to, cases weighing greater than approximately 30 grams, intent to distribute, etc. Additionally, defoliated stalks, fiber, and seeds associated with the genus C*annabis* will not be tested. Cases that are submitted that do not meet the established criteria will be returned. Any case weighing over 100 pounds will only be accepted by appointment. Headquarters lab appointments can be established via email to mgr.chem@gbi.ga.gov; regional lab scheduling can be done by contacting the main phone number of the laboratory where the evidence is to be submitted.

Evidence Submissions

Evidence must be sealed and labeled prior to submission to the laboratory. One DOFS case number will be used for all evidence submitted with the same agency case number. Packaging, labeling and the method of submission is very important for agencies using one agency number for ongoing investigations, or for cases with multiple suspects. This information is used to determine what evidence will be analyzed. All evidence items associated with an agency case number must be grouped (attached) together with attached respective submission forms. Each undercover "buy" must be packaged separately, labeled with the date, and submitted to the lab as a separate request. Evidence seized from a search warrant must be packaged separately from previous "buy" cases and submitted as a separate request for analysis. Seizures at the same location attributable to a **specific** subject must be packaged separately from other evidence and submitted as a separate request for that individual. Evidence seized from different **properties** (for forfeiture of property) must be packaged separately and submitted as different requests. When trafficking cases are suspected, or more than one ounce of marijuana is suspected, all evidence to be used in the weight determination must be submitted on one submission request. A separate report will be generated for each request.

All information necessary for receiving case(s) comes from the online submission form. The subject's name and agency case number on the form must agree with the name and agency case number on the outer package. Do not submit paperwork or the Evidence Submission Form inside the sealed evidence.

With the exception of evidence seized at a clandestine laboratory and pressurized and/or depressurized devices from THC extractions, all evidence will be received using the lockboxes. Please make arrangements prior to bringing large cases. When mailing evidence to the laboratory, write "Attention DI" (**do not write "Drugs"**) on outer packages. Mail drug evidence separately from other types of evidence and send to the appropriate laboratory.

Drug Evidence

All drug evidence must be submitted to the laboratory in a **sealed plastic bag**, **box, or bucket as appropriate.**

Sealed Plastic Bag (s):

Evidence should be double bagged. The outer plastic bag should be at least 8" x 10" in size, clear on at least one side, and must be sealed with a **tamper evident seal.** This can be tamper-proof evidence tape, a tamper-proof seal, or heat seal. The initials of the sealing officer must be written on, and extending across, this seal

(that is, some of the initials will be on the seal as well as on the packaging). Care should be taken to ensure all self-sealing type evidence packages are in fact correctly closed. The following information must be clearly written on the outer sealed plastic bag: Name of subject(s), Case officer(s), Law Enforcement Agency and case number, and Inventory of Contents.

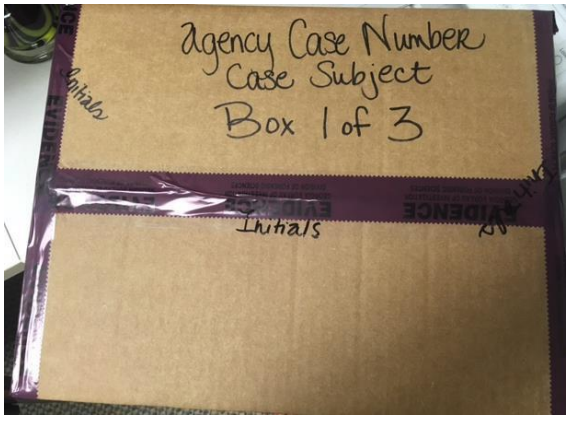
Sandwich bags are not acceptable because of thin material used in construction. Heavy construction zip-lock plastic bags, freezer bags, or bags of a similar weight plastic are acceptable packages. No loose materials such as powders, tablets, capsules, crack cocaine chunks, marijuana, etc. should be placed in the outer bag unless first secured in an inner plastic bag. The evidence must be visible in the inner bag. Do not include any evidence receipts inside the outer plastic bag that need to be signed by DOFS personnel. Additional bags should be used to prevent overfilling the outer plastic bag because it must be resealed upon completion of the scientific analysis. Appropriately label evidence if obtained from an area of possible chemical or biohazard contaminations such as toilets, mouth, etc.

Solids:

Solid Samples over 1 kilogram (powder, crystals, tablets)

- All solid samples over 1 kilogram will be submitted in boxes or plastic containers.
- No box larger than 15x15x15 will be submitted without prior aproval from the LM/CSM.
- Boxes or plastic containers will not weigh more than 25 pounds (approx 10-12 kg)
- Boxes cannot be reused if their integrity/stability/form is jeopardized.
- Boxes and plastic containers from the same case will be labeled to indicate the unique number as well as the total number in the submission (example: Box 1 of 10 or 1/10). Boxes and plastic containers must also contain unique identifying case information.
- Boxes will have ALL seams and corners taped with packing tape and evidence tape or with reinforced fiber tape and evidence tape.
- Plastic containers will have all tops taped with packing tape and evidence tape or with reinforced fiber tape and evidence tape.
- For powder and crystal cases, there must be an inner liner/barrier to avoid leaks. The inner liner can be plastic bags or paper bags at the discretion of the submitting agency.

Examples of proper solid sample submission:



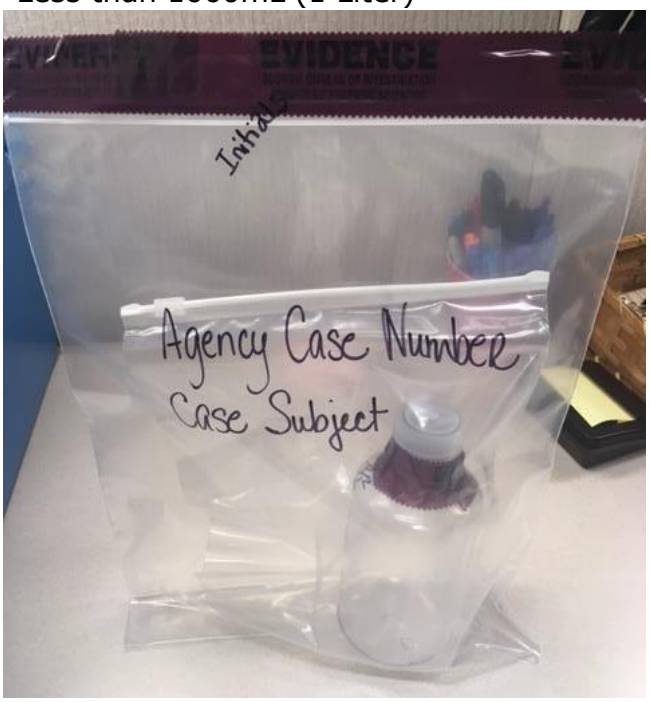
All Liquids (includes wet solid material)

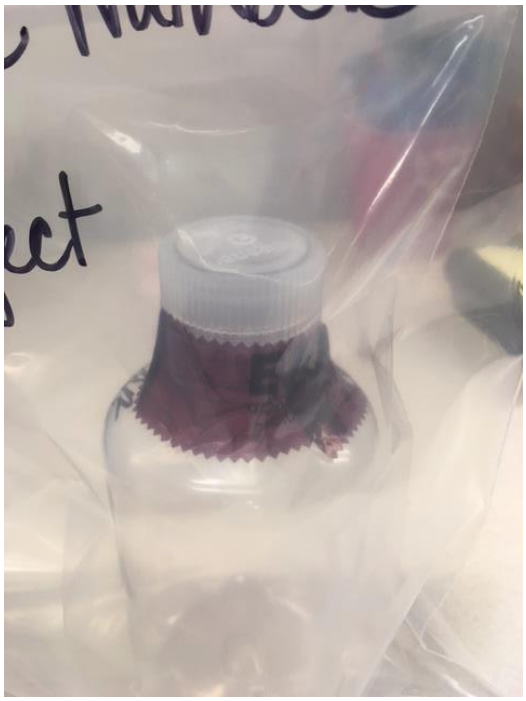
- Liquids with a volume of 1000 mL (1 Liter) or less will be submitted in leak-proof containers. These bottles should be double bagged in clear plastic evidence bags.
- Liquids with a volume greater than 1000 mL (1 Liter) will be submitted in sealed hazmat type buckets (as pictured below) of appropriate size. The inner contents of the bucket can be plastic bags or other containers at the discretion of the submitting agency for integrity of evidence purposes.
- Buckets must be labeled with unique case information and sealed. If more than one bucket is submitted from the same case, it will be labeled to indicate the unique number as well as the total number in the submission (example: Bucket 1 of 10 or 1/10).

Examples of proper liquid sample containers:

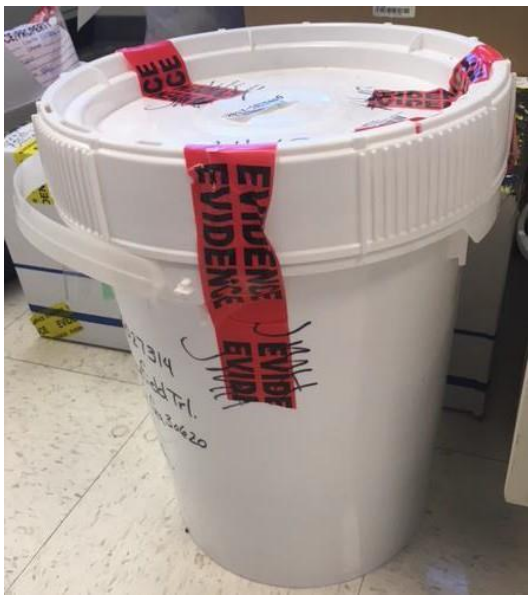
Examples of proper liquid packaging:

-Less than 1000mL (1 Liter)





-Greater than 1000mL (1 Liter)



Exceptions in Packaging:

Any wet plant material (such as marijuana plants, leaves, mushrooms, etc.) must be dried before submitting. Allow the material to air dry before packaging and transporting to the lab. Trapped moisture will cause the evidence to rot and be unsuitable for analytical testing. Once dried, place the plant materials in a paper bag.

LSD is a light sensitive drug. When submitting possible LSD samples, package the samples in a manila envelope or small paper bag before placing in the outer plastic bag.

Clandestine Laboratory Evidence Submissions

Safety precautions

In addition to the normal precautions taken when working cases, the following conditions must be considered when analyzing clan lab submissions:

-Anhydrous ammonia is corrosive. Contact with liquid ammonia may cause immediate, severe chemical burns, as well as frostbite. Nonpressurized liquid

ammonia will form ammonia gas. This gas is extremely corrosive and can burn and damage eyes, skin, mucous membranes, and any other exposed tissue. If inhaled, irritation of the respiratory system may occur, with coughing and breathing difficulty. Delayed pulmonary edema may occur following overexposure by inhalation. Overexposure to this gas may be fatal. Appropriate personal protection equipment must be worn. Items required are at a minimum, eye protection, hand protection and clothing protection. See MSDS for more information

-Liquids may be strongly acidic or alkaline and may emit hazardous vapors.

- Liquids may contain toxic solvents.

-Extraction may release toxic gases (e.g. phosphine).

- Sample containers may be under extreme pressure.

-Disguised incendiary devices may mistakenly be submitted as evidence (e.g. tin-foil balls).

-Solid materials may exhibit noxious odors – weighing in a fume hood may be required.

To minimize adverse reactions from incompatible materials, each item from a clandestine lab must be submitted in a separate evidence package.

All submitted clandestine laboratory evidence must be inspected and approved by designated DOFS staff before evidence will be received by the DOFS. Do not place clandestine lab samples in the lockbox.

Packaging Requirements for Clandestine Lab Samples (excluding suspected anhydrous ammonia)

Liquid samples must be packaged in glass vials with teflon caps. Each glass vial must be contained within a polypropylene bottle to ensure that the liquid will be retained if the glass vial should break or leak. Each bottle must be packaged separately.

If samples are packaged in an unsuitable manner, this evidence will not be accepted.

A maximum of approximately 100 mL of liquid sample per evidence item will be accepted.

Packaging Requirements for anhydrous ammonia samples

Preliminary field testing for anhydrous ammonia must be performed. Only samples exhibiting positive results will be accepted. Documentation (utilizing OPSCHEM Form 25) of these tests must accompany the submitted sample. The requesting agency must utilize a DOFS approved sampling cylinder when collecting suspected liquid anhydrous ammonia sample. No sample will be transported, received or tested by GBI-DOFS staff in any unapproved container.

The following are mandatory items for anhydrous ammonia sample submission: Swagelock – 304L-HDF4-150 Stainless Steel Sample Cylinder (with appropriate ANHYDROUS AMMONIA labeling) fitted with two SS-14DKM4-E valveswith two SS-4-HC-7-4 Female Hose Connectors, assembled using teflon tape on all threads.

Fire Debris Evidence Submissions:

Petroleum products and other ignitable liquids are the most common types of materials used in arson cases. Because alcohol, gasoline, paint thinners, solvents, and other similar fluids frequently do not burn completely, residues of such fluids can be recovered from fire scenes and identified. The packaging and preservation of samples from the time of collection to the time of analysis is critical. Fire debris evidence, therefore, must be submitted to the laboratory in a timely manner.

All fire debris evidence must be submitted in vapor-tight containers such as glass "mason" jars with screw-on lids or lined metal cans with friction fit lids. Unlined metal cans are not acceptable containers. Paper and/or plastic bags are **not** vapor-tight containers and will not be accepted by the laboratory. The evidence containers must be properly closed to provide a vapor-tight seal and not filled over **three-quarters** full. Debris around the rim can keep the container from sealing properly. The outside of the metal cans must be kept clean and dry to reduce corrosion of the can. Any broken lid seal (jar or can) or corrosion on the metal container may allow ignitable liquid vapors to escape.

Samples of raw ignitable liquids, **not to exceed 25mL**, must be submitted to the laboratory in a sealed bottle with TFE-lined caps. "Mason" jars and metal cans are not suitable containers for raw liquid samples.

A tamper evident seal must be placed on each lid and initialed. All containers must be labeled with victim's names, investigator's name, date and time of collection, specific source and type of sample (e.g. "Burned carpet from northeast corner of master bedroom"), and any odors noted at the fire scene by either human or canine detection. In addition, a DOFS Submission Form, including a description of the fire scene, is required.

Syringe Contents Evidence Submissions:

GBI DOFS will accept syringe contents without any prior approval necessary. We do not, however, accept syringe bodies or needles.

To submit the contents, you can use either of the following methods most convenient to your case scenario.

- Dispense the liquid syringe contents onto a clean gauze or cotton ball. The gauze or cotton ball can then be placed into a plastic bag before sealing up in an evidence bag.

Dispense the liquid syringe contents into a leak proof container. Examples include a screw capped vial, or a urine specimen cup. Do not use blood collection tubes. If a urine specimen cup is used, make sure the evidence bag and submission form are labeled to indicate the liquid is not urine.

If the syringe contains residue only, draw up rubbing alcohol into the syringe using the plunger and then dispense it using either of the two ways stated above.

Pressurized/Depressurized devices:

No GBI lab will accept pressurized or depressurized devices without pre-approval and inspection upon arrival. This includes gas tanks and devices used in conjunction with BHO (butane honey oil) manufacturing. THC/BHO waxes or oils are accepted with no approvals needed.

Non-Acceptable Items:

The following items will not be accepted by the laboratory for analysis or storage because of biological, chemical or physical safety hazards:

Used presumptive field ID kits

Large amounts of chemicals (submit only small, representative samples)

Razor blades

Syringes

Wet water pipes

Any other biohazards determined to be dangerous to laboratory personnel

Seeds. DOFS will not germinate seeds in order to perform testing for marijuana.