

Chemistry Overview

The primary function of the Chemistry discipline is to analyze chemical compounds for identification of materials in violation of state or federal drug laws and also for the analysis of evidence collected from fire scenes. The discipline also provides technical support in undercover operations, supplies the courts and other state agencies with factual drug information, provides information to the general public and news media about drug abuse, and has a team of scientists trained to assist police officers in clandestine laboratory seizures,.



Effective July 1, 2004, per GBI Operations Bulletin 2004-01, suspected marijuana samples will be tested as described within the bulletin. A copy of the bulletin can be found on the News and Updates link of the GBI-DOFS website, <http://dofs.gbi.georgia.gov>.

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Drug Identification

The Chemistry Section's primary responsibility is to analyze items of evidence for the presence or absence of Controlled Substances, or drugs.

Identification of substances in violation of federal or Georgia drug laws

Quantification of cocaine and methamphetamine purity when required

Free base determination on cocaine cases prosecuted under federal law

Consultation in clandestine laboratory seizures (coordinated through GBI-HQ)

Assistance in undercover drug operations

Reports include information weights of samples submitted, when applicable; schedule of controlled substances identified as outlined in Georgia law; and identify the analytical procedures used during testing. Police training in marijuana identification

The identification of controlled substances is accomplished by performing **at least** two analytical examinations. For every item of evidence that is analyzed, a chemist issues an Official Report. These analytical examinations may include:

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

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

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. This 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 routinely respond to clandestine laboratory sites, but does have personnel trained to provide guidance and technical information if needed.



CLRT member about to sample suspected methamphetamine lab. This scientist is wearing a Self Contained Breathing Apparatus (SCBA).

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. Often, the top layer is an organic liquid while the bottom layer is a basic aqueous solution.

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 log and/or submission form. Please write legibly. The subject's name and agency case number on the form must agree with the name and agency case number on the outer plastic bag. Do not submit paperwork or the Evidence Submission Form inside the sealed evidence.

With the exception of evidence seized at a clandestine laboratory, all evidence will be received using the lockboxes. Large, bulky cases will be received, sampled and returned. Please make arrangements prior to bringing large cases to allow time for the sampling. When mailing evidence to the laboratory, write "Attention DI" (**do not write "Drugs"**) on all 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 outer plastic bag** and a **secured inner plastic bag**.

Sealed OUTER Plastic Bag:

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, Prosecuting Agency, 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.

Secured INNER Plastic Bag:

The inner plastic bag must be secured so that the contents will not fall out of the bag. The inner bag must be clear on both sides. Like items should be grouped together and placed in one inner plastic bag. Different types of evidence must be packed so that cross-contamination does not occur (i.e. Do not place a marijuana pipe in a plastic bag with loose marijuana leaves).

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 double paper bag.

Khat samples should be submitted in paper bags or boxes as quickly as possible to the lab for testing. The sample should be frozen or cold to avoid chemical breakdown. Chemistry management should be notified of the submission for expedited testing.

Brownies or chocolate suspected to contain plant material may be submitted in food storage containers and then double bagged. The submission of these items does not require prior approval.

Large bales of marijuana, kilos of cocaine, large plants, etc. may be submitted in large bags or as packaged.

Liquids must be submitted in a leak-proof, screw-capped bottle placed in an outer sealed plastic bag. Liquids that present a biohazard (e.g. from toilet) should be clearly labeled as such.

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.

Glass or smoking devices should be packaged in bubble wrap. The bubble wrapped glass should be double bagged. If the evidence contains broken glass, plastic containers or boxes may be used to house the fragments and the evidence should be clearly labeled as containing broken glass.

Clandestine laboratory evidence submissions:

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.

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.

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 OPS DI 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 valves with two SS-4-HC-7-4 Female Hose Connectors, assembled using teflon tape on all threads.

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 or the contents from syringes (contents may be submitted in life-threatening situations, only with prior DOFS approval)

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.

Fire Debris

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.