

Guidelines on the Organization of Samples in a Laboratory

A tutorial on the management of samples including
their identification and preservation

Created by the Office of Research Compliance and Training
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Introduction

- This tutorial provides an overview of generally effective practices for storage and organization of research samples
- You should follow guidelines established by:
 - Principal Investigator
 - Research discipline
 - Submission protocols required by external lab if samples are being sent out for analysis
- This tutorial does NOT cover samples collected for clinical research



Why Properly Label Samples?

- Reduces risk of contamination
- Reduces injury to self and others
- Maintains clean and organized working environment
- Avoids loss or damage to valuable samples
- Maintains integrity of research being conducted

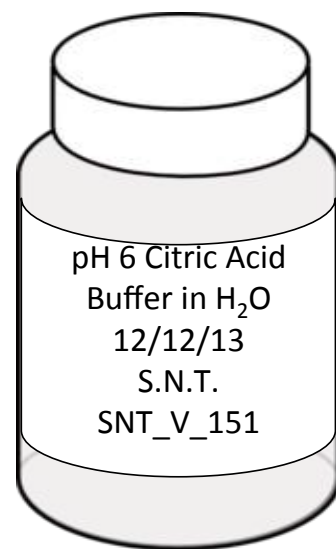


Results of improperly labeled and stored samples = a laboratory nightmare



Key Information to Include

- Sample labels should include the following information (at a minimum):
 - Name/initials of researcher
 - Notebook code (links sample to specific notebook entry)
 - Date sample prepared
 - Sample identification such as:
 - Chemical structure or name
 - Identification number
 - Sample name
 - Any solvents, substrates, etc. sample is in/on



Samples Collected Outside a Laboratory

- An agreed upon labeling system should be followed by all persons collecting samples
- For samples collected outside the laboratory, other information important to the sample should be included on the label
 - Location where sample was collected (coordinates, address, etc.)
 - Variables that may affect sample, such as: air temperature, altitude, water depth, humidity, etc. during collection
 - Time of collection
 - Type of sample such as: sediment, fungi, rock dredge, etc.
- If collecting multiple samples, consider using pre-printed labels that can be completed during sample collection



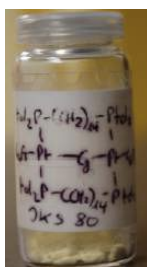
Large Number of Samples Stored in Small Vials

- If many samples are being created and stored in small vials or centrifuge tubes, use a coding system
- Document coding system in laboratory notebook
- Many companies package vials in partitioned trays that can be used to inventory samples
- Include an index card that identifies the samples and the coding system in the same box as the samples
- Be sure the small vials are secure within the secondary container to avoid lost samples



Sample Labeling Do's and Don'ts

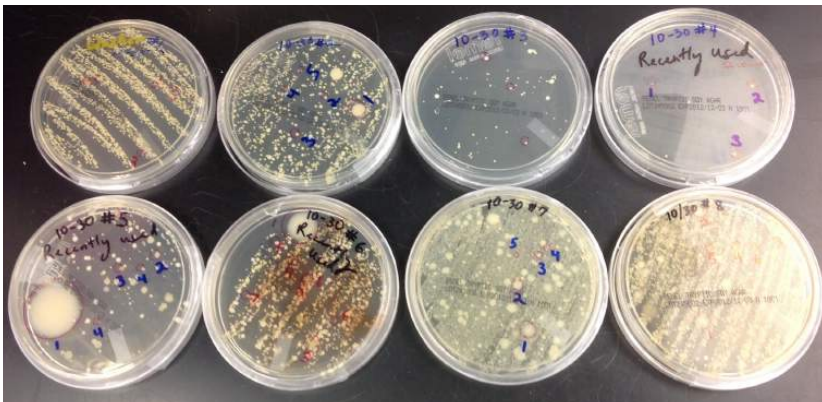
- ✓ Use appropriate label written with non-bleed ink or printed from a printer
- ✓ Use legible handwriting in a universal language understood by *everybody* in your lab
- ✓ Use clear tape to protect label
- ✓ Label without obstructing view of sample contents
- ✓ Place label evenly
- ✓ Choose a label suited for storage conditions (e.g. labels with special adhesive for temperatures at -70°C)
- ✗ Write directly onto container with marker or wax pencil
- ✗ Write illegibly
- ✗ Use language not understood by everybody in laboratory
- ✗ Block view of contents with label
- ✗ Haphazardly place label



Two Types of Samples

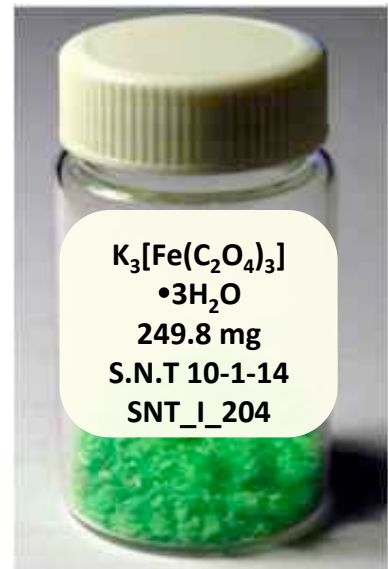
- Active Samples

- Samples that are a precursor to the next procedural step
- Samples that require an incubation or wait period before next steps or analysis
- The sample container is meant as temporary storage
- Even if it is temporary storage, always include a label



- Passive Samples

- Samples that are “complete”
- Samples that are awaiting further analysis but it will not take place immediately
- Choose an appropriate container and label for the type of storage



Choose an Appropriate Container

Samples that are volatile should be in a tightly sealed container, to prevent evaporation.

Ex: crimp seal vials



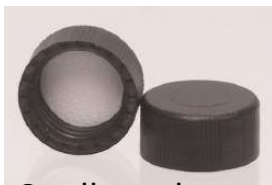
Choose appropriate storage containers for samples that need to be stored in a freezer or refrigerator. Ex: cryo tubes



Light-sensitive samples should be in amber vials. Some researchers also wrap vials in aluminum foil. If wrapping in foil, include label on outside of foil.



Some containers may deteriorate in presence of some chemicals and elevated temperatures, which will contaminate sample--choose inert containers and caps.



Cardboard lined vial lids

Vs.



PTFE lined vial lids

Choose the container most appropriate for the length of storage, long-term vs. short-term.



Plastic (disposable) petri dish



Pyrex petri dish



Containers That Are Not Appropriate for Long-term (>1 week) Storage of Samples



Laboratory glassware is costly, not designed for long-term storage, and often lacks a method to tightly “cap” the container.



Plastic containers are not always sterile and not compatible with many solvents or extreme temperatures. Check manufacturer’s recommendations before storing samples.

Weigh dishes should NEVER be used for storage of samples.



Organization and Storage of Samples

Each researcher should have a labeled area in each of the shared laboratory spaces. Ex: lab bench, fridge, freezer, glovebox, etc.



Samples sensitive to air, temperature, and/or moisture should be prepared and stored in the appropriate environment. The label needs to note the environment required.



Group samples by type and/or project. Ex: minerals



When to Dispose of Samples

- When samples cannot be re-used
 - Samples that were prepared for a one-time use as in the case for many instrumentation samples
 - Ex: TEM grids, microscope slides, etc.
- When samples have been contaminated
 - The integrity of the sample has been compromised, therefore results are unreliable
- When samples are expired
 - Samples that degrade over time
- When samples are no longer needed, dispose of samples properly (always check with PI and EH&S)

Lab space is limited. Keeping space free of unwanted samples provides an organized working environment, in addition to reducing risks of contamination and/or injury



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What to do with Samples when You Are Permanently Leaving Laboratory or Anticipating a Long-term Absence?

- ALWAYS check with PI and/or lab manager about the proper storage location of samples
- Be sure samples are properly labeled and organized
- Submit an inventory of samples and reagents to PI
- If PI has identified your successor, be sure to put the samples in a location that they can easily find
- Valuable samples should be in a location that are known to the PI and remaining group members
- Properly dispose of any samples that can be discarded



Summary

- Follow sample labeling guidelines as defined by your:
 - PI
 - Discipline
 - Analysis lab protocols
- Label samples clearly with the following information:
 - Name, date, sample name (or structure), notebook code, collection site information (if applicable)
 - If using small tubes, include information within container housing tubes
- Choose a label and storage container most appropriate for:
 - Type and size of sample
 - Length of storage
 - Location of storage
- Keep samples organized. Categorizing by project, type, researcher, etc.
- When samples are no longer needed, are contaminated, and/or degraded, dispose of them properly
- When leaving laboratory, be sure samples are in a location that can be easily accessed by remaining group members and PI



Additional Resources

- Other tutorials on Rascal
 - *Best Practices for Data Management when Using Instrumentation*
 - *Good Laboratory Notebook Practices*
- Data storage repositories
 - NIH-supported data repositories:
http://www.nlm.nih.gov/NIHbmic/nih_data_sharing_repositories.html
 - SESAR, System for Earth Sample Registration:
<http://www.geosamples.org/>
 - EarthChem, access to geochemical, geochronological, and petrological data
<http://www.earthchem.org/>

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References

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- <http://www.ohsu.edu/xd/health/services/lab-services/specimen-collection/labeling-requirements.cfm>
- <http://www.labmanager.com/laboratory-technology/2010/11/five-common-mistakes-in-lab-labeling?fw1pk=2#.VYrdXqZ97ZF>
- https://www.iuhealth.net/pdf/pathology-lab/nurse-resources/labeling_guidelines.pdf

