Preparation and Proper Disposal of Buffered Formalin

1. SCOPE AND APPLICATION

This method details the preparation of a 100% buffered formalin solution, which is used in preserving biological samples, and the proper disposal of waste formalin when waste formalin cannot be recycled as per SOP IZ-38. This preservative is used for samples with LIMS test codes DTM-QL-C and PRN-QL-C. In a diluted 10% form, it is used to preserve macroinvertebrate samples and is collected during the preparation of these samples with LIMS test codes ending in -QLDC, -QNLC, -QNNC, -QNCC, -QNCP, -3COR, -VNUK, or -VNSG.

2. SUMMARY OF METHOD

Formaldehyde (37%) and sodium bicarbonate are mixed in the proper proportions, labeled, and stored. Waste formalin is transferred to the waste formalin drum located in Chemical Waste Storage until the date of DEP hazardous waste pick-up.

3. APPARATUS AND EQUIPMENT

3.1 Analytical balance
3.2 Weigh pans
3.3 2000 mL flask
3.4 Funnel
3.5 Stir bar and stir plate
3.6 pH Meter
3.7 Storage container for buffered formalin, made of appropriate material such as Nalgene plastic
3.8 Laboratory cart
3.9 Large diameter funnel
4.0 Safety equipment (see section 8.1)

4. REAGENTS AND CHEMICALS

4.1 Sodium bicarbonate (or sodium borate); stored in B246
4.2 Formaldehyde (37%) = formalin (usually purchased in 5-gallon plastic containers); stored in C215.
4.3 Waste container ¾ full of ~ 10% formalin; located in B205.

5. METHOD FOR PREPARATION OF BUFFERED FORMALIN

5.1 Contact the lab coordinator ahead of time to determine a time to buffer formalin when tests are not being run. In case of a spill, this will help minimize disruption to the lab staff and function.

5.2 Safely transport formaldehyde (37%) from Chemical Storage (C215).

5.2.1 Obtain a key to Chemical Storage (C215).

5.2.2 This task should be performed by two people. Take a cart and your safety equipment with you to the storage room. Before entering the room, have safety gear in place. Prop open the door. One person should stand by the door in the event of an accident in order to call for help if needed. Carefully place the formaldehyde (37%) container on the cart.

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5.2.3 Take the container to the laboratory.

5.2.4 After use, follow the same safety procedure to return the formaldehyde (37%) container to Chemical Storage and return the key to its proper location.

5.3 Place a clean weigh pan on the balance. Tare the balance. Weigh out approximately 5.0 grams of sodium bicarbonate per 500 ml of formaldehyde.

5.4 Notify a co-worker that formalin is being buffered. Use a laboratory hood or well-ventilated area away from other working laboratory staff. Carefully pour the 37% formaldehyde to be buffered through the funnel into the flask. Ask a second person for help if the container is large, heavy, or awkward to hold. **Do not buffer more than 2000 mL at one time.**

Note: If a spill should occur, evacuate the room and **immediately** notify the Biology Safety Officer, Laboratory Safety Officer, Taxonomy Supervisor and Biology Program Administrator. If there is an injury, a wash down shower is in the hallway outside each lab.

5.5 Inside the lab hood, carefully lower a stir bar into the flask and place the flask on a stir plate. Gradually add the sodium bicarbonate to the flask of formalin, allowing the stir bar to mix the solution. Check the pH at each interval until the pH is between 7.5 and 8.0.

Note: All of the sodium bicarbonate may not dissolve into the formaldehyde, as this is a supersaturated solution. The solution should not be milky white; this indicates that too much sodium bicarbonate was added.

5.6 In the laboratory hood, carefully transfer the buffered formalin through the funnel into an appropriate storage container. Label the container “100% Buffered Formalin”, with the date the formalin was buffered and the analyst’s initials.

Note: The buffered solution can be transferred to smaller Nalgene plastic containers for field and laboratory use. Label smaller containers “100% Buffered Formalin”, with the dates the formalin was buffered and transferred.

5.7 Clean work area and equipment appropriately.

6. METHOD FOR PROPER DISPOSAL OF FORMALIN

6.1 Dispose of waste formalin when it cannot be recycled. Recycling, per SOP IZ-38, is the preferred method. Dispose of waste formalin when the waste container is approximately ¾ full. Allowing the container to become completely full increases the risk of spillage or injury during disposal. Proper safety procedures, such as proper lifting techniques should be followed when dealing with chemicals and lifting heavy objects.

6.2 Obtain a key to Chemical Waste Storage (C217).

6.3 Place the ¾ full formalin waste container on a cart.

6.4 This task should be performed by two people. Take the cart and proper safety equipment to the chemical waste storage room. Before entering the room, have safety gear in place. Prop open the door. One person should stand by the door in the event of an accident in order to call for help if needed.

6.5 NOTICE the drum label before disposing/transferring waste. Putting waste in an inappropriate drum could result in a poisonous gas. With the aid of the large diameter funnel, carefully transfer the waste formalin from the container to the correct drum. Record the transfer in the logbook by the door.

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Note: If a spill should occur, evacuate the room and **immediately** notify the Biology Safety Officer, Laboratory Safety Officer, Taxonomy Supervisor and Biology Program Administrator. If there is an injury, an alarm and washdown shower are outside the entrance to the chemical waste storage room.

6.6 Return the empty waste container to the laboratory (B205). Return the key to the proper location.

7. QUALITY CONTROL AND DOCUMENTATION

7.1 Chemical Waste storage room transfer logbook. Use a black pen for all logbook entries and corrections.

7.2 To correct raw data entries, place a single line through the incorrect entry, write the corrected entry near the error and initial and date the correction. If the correction requires an explanation, write a comment and reference the error.

7.3 Refer to the Laboratory Quality Manual.

8. SAFETY

8.1 Lab coat, latex or vinyl gloves, and eye protection are required when working with formalin.

8.2 Avoid breathing formalin fumes or exposing co-workers to them. Use proper safety equipment, a lab hood or chemical ventilation system, and keep face away from open containers of this chemical. Leave the door to chemical storage room open to help ventilate the area. Work in a well-ventilated area.

8.3 Refer to the MSDS for information about reagents and chemicals in this SOP.

8.4 Refer to the Laboratory Health and Safety Plan.

9. POLLUTION PREVENTION AND WASTE MANAGEMENT

9.1 Use caution when handling formalin. Should a spill occur, **immediately** notify the Biology Safety Officer, Laboratory Safety Officer, Taxonomy Supervisor, and the Biology Program Administrator. Proper clean-up and reporting procedures must be followed.

9.2 Refer to the Laboratory Health and Safety Plan.

10. REFERENCES

10.1 DEP Laboratory Quality Manual, https://floridadep.gov/dear/florida-dep-laboratory/content/dep-laboratory-quality-assurance-manual-and-sops

10.2 DEP Laboratory Health and Safety Plan, https://www.floridadep.net/resources/health-safety-manual

10.3 SOP IZ-38, *Formalin Assay, Recycling and Buffering*

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Appendix of Significant Changes

01/13/2012	Added storage location and handling to step 4.2. Added note to step 5.3 stating what to do if a spill occurs.
01/24/2013	Merged SOP IZ-11, Proper Disposal of Formalin, into this SOP.
12/29/2014	Formatted for 508 compliance
01/07/2016	Updated name of the Quality Manual and links.
03/08/2017	Standardized SOP naming conventions.
03/14/2018	Updated DEP Laboratory Quality Manual link.
02/09/2021	Updated link to the health And Safety plan.
02/10/2021	Clarified the amount of formaldehyde needed.
01/03/2024	Corrected minor grammatical errors.

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