Preparation of 20% Dilute Mineral Water (DMW)

1. SCOPE AND APPLICATION

    1.1. This method is based on EPA 821-R-02-012 and practical laboratory experience. 20% Dilute Mineral Water (DMW) is used to prepare culture media for Ceriodaphnia dubia. It can also be used as control-water and dilution water for Ceriodaphnia dubia bioassay tests.

2. SUMMARY OF THE METHOD

    2.1. 16 liters of distilled water and 4 liters of plain Perrier® water are placed into a clean 20L carboy. 20 mL of 2 µg/mL Sodium Selenate solution and 20 mL of 2 µg/mL B12 are added to the carboy. The solution is aerated for approximately 24 hours. Physical-chemical parameters are measured on the solution prior to use. The batch number and expiration date are written on the container. Preparation is recorded in the DEP Laboratory Information Management System (LIMS).

3. EQUIPMENT AND SUPPLIES

    3.1. Nalgene carboy, 20 L

    3.2. 100 mL Graduated cylinder

    3.3. 1 mL Pipet with cotton plug removed

    3.4. Airline tubing, 1.52 m long, 4.76 mm ID

4. REAGENTS AND STANDARDS

    4.1. Distilled water

        4.1.1. Purchased through a local grocery store in 3.78 L containers

    4.2. Deionized water

    4.3. B12 working solution

        4.3.1. Prepare in advance per SOP TA-09.08.

    4.4. Sodium Selenate working solution

        4.4.1. Prepare in advance per SOP TA-09.08.

    4.5. Plain Perrier ® water. 4 liters for each 20 L batch of 20% DMW

        4.5.1. Five full 750 mL bottles and 250 mL from a sixth bottle, or four 1 L bottles are needed.

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5. METHODS

5.1. Clean carboy with a scrub brush, detergent, and water. Rinse copiously with tap water. Acid rinse with 10% HCl (only before first-time use) and thoroughly rinse with DI water. Cover inner surface with 10% bleach solution. Rinse with tap water. Cover inner surface with a 10% sodium thiosulfate solution. Triple rinse with DI water.

5.2. Add 16 L of distilled water to the carboy.

5.3. Add 4 L of Perrier® water to the carboy.

5.3.1. If using 750 mL bottles of Perrier®, add to the carboy five full bottles and 250mL from the sixth bottle. Recap the sixth bottle and save the excess for the next batch.

5.3.2. If using 1 L bottles of Perrier®, add 4 full bottles to the carboy.

5.4. Add 20 mL of Sodium Selenate working solution and 20 mL of B12 working solution to the carboy.

5.4.1. Sodium Selenate and B12 are necessary nutrients for growth and reproduction. The 20 mL of working solutions yield 2 µg/L sodium selenate and 2 µg/L of B12.

5.5. Connect the airline tubing to the pipet and to the compressed-air outlet located to the right of the fume hood in the Culture room.

5.6. Place the pipet into the carboy so that the tip will be near the bottom of the carboy.

5.7. Cover the top of the carboy with the lid and aerate for 24 hours. After 24 hours, remove the pipet from the carboy and close the air outlet. Close the top of the carboy with the lid.

5.8. Measure the conductivity, pH, ammonia, chlorine, hardness, and alkalinity of an aliquot of the aerated 20% DMW per SOPs TA-06.36, TA-06.35, TA-06.22, TA-06.08, TA-06.43. Record the results in the appropriate LIMS logbooks.

5.8.1. Value ranges normally obtained for moderately hard water are:

5.8.1.1. pH: 7.8-8.3 S.U.

5.8.1.2. Hardness: 80-100 mg/L

5.8.1.3. Alkalinity: 60-70 mg/L

5.8.2. Adjust as necessary by either diluting with distilled water or adding more Perrier® water. Add additional Sodium Selenate (1 mL working solution per liter of additional dilution) as needed.

5.8.2.1. Adding distilled water decreases alkalinity and hardness; adding Perrier® water increases alkalinity and hardness. After additional aeration, the pH can be adjusted with hydrochloric acid or sodium hydroxide. Thus far, adjustments have not been necessary.

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5.9. Using the labeling tape and the lab marker, label the carboy "20% DMW", "Batch #", "Date prepared", "SS added", “B12 added”, and the preparer’s initials. Add an expiration date of 14 days from the preparation date to the label. Store the 20% DMW on the countertop to the immediate right of the fume hood.

5.9.1. Discard leftover 20% DMW 14 days after preparation. The 20% DMW can be safely poured down the sink.

5.9.2. NOTE: If necessary, 20% DMW can be used after the 14-day expiration date if no visual evidence of contamination exists (fungal/bacterial growth), and if the 20% DMW has been stored in a sealed container.

5.10. Log the Prepared 20% DMW into the DEP LIMS database using the Standard Preparation Tracker. Print a label with a legible LIMS Serial Number and attach the label to the carboy near the hand-written label from Step 5.9.

6. DATA ARCHIVAL

6.1. Use a black, waterproof pen for all bench sheets and logbooks.

6.2. To correct raw data entries, place a single line through the incorrect or illegible entry, write the corrected entry near the error, date and initial the correction. Do not overwrite entries.

6.2.1. The corrected entry is written as near as possible to the error or else in the comment box on the appropriate bench sheet.

6.2.2. If the correction requires an explanation, write a comment and reference the error with a letter. Initial and date the explanation. Do not attempt to put all information (correction and comments) into a small space.

6.2.3. Use sequential alphabetical annotation to identify errors and corresponding comments (use A for first error and use A for corresponding explanatory comment; use B for second error, etc.).

6.3. If a problem occurs during sample processing, a nonconformance report (NCR) is submitted describing the problem and the corrective action.

6.4. Preparation is recorded in DEP Laboratory Information Management System (LIMS).

7. QUALITY CONTROL

7.1. Refer to DEP Laboratory Quality Manual for corrective action and handling out-of-control data.

7.1.1. If a problem occurs during the sample processing or testing, the following steps are performed: 1) Lab supervisor is notified. 2) Client is notified (client makes decision for additional testing). 3) Section administrator is notified. 4) A non-conformance report (NCR) is submitted describing the problem and the corrective action. To create NCR: open LIMS and go to Laboratory/Administrative/Non-Conformance Report. Refer to

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https://floridadep.gov/dear/quality-assurance/content/dep-sops for sample collection and preservation, and the Laboratory Quality Manual for corrective action and handling out-of-control data.

8. SAFETY/HAZARDOUS WASTE MANAGEMENT

8.1. Proper laboratory protection, including lab hood or ventilation system, lab coat, gloves and safety glasses, is required when working with chemicals and unprocessed samples.

8.2. Refer to the Laboratory Quality Manual for sample disposal.

8.3. Refer to the Laboratory Health and Safety Manual and Hazardous Waste Management.

8.4. Read MSDS information for reagent handling and disposal.

9. REFERENCES

9.1. EPA-821-R-02-012 Method for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.

9.2. Environment Canada Report EPS 1/RM/21: Biological Test Method: Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia

9.3. Laboratory Quality Manual

9.4. Laboratory Health and Safety Manual and Hazardous Waste Management

9.5. DEP SOP LB-002. Non-Conformance Reporting System.

9.6. DEP SOP TA-09.08. Preparation of B12 and Sodium Selenate for use in 20% DMW, MHWCD, and Pseudokirchneriella subcapitata Culture Media

9.7. DEP SOP TA-06.08 Measuring Total Alkalinity and Hardness

9.8. DEP SOP TA-06.22 Measuring Total Residual Chlorine using the Hach Pocket Colorimeter and Colorimeter II Test Kits

9.9. DEP SOP TA-06.35 Measuring Ammonia using the Hach Ammonia Nitrogen Pocket Colorimeter II Test Kit

9.10. DEP SOP TA-06.36 Calibration and Use of the Fisherbrand Traceable Bench Conductivity meter for Conductivity and Salinity

9.11. DEP SOP TA-06.43 Calibration and Use of Fisherbrand Accumet AB315 pH/mV Meter

APPENDIX OF CHANGES:

03/03/2008 Added *Scope and Application*, *Summary of the Method*, and *Appendix of Significant Changes.* Added reference to SOP LB-002 to Documentation and Corrective Action *Step 2* comment.

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03/18/2009 Added *References* Section Added extended use note to Methods STEP 8 Comment. Deleted specifically from *Scope and Application* section. Added “Plain” to item 7 in Materials list.

12/13/2013 Reformatted SOP.

02/09/2015 Formatted for 508 compliance.

11/30/2016 Reformatted to expand sections.

10/12/2017 Added B12 addition and new reference.

11/21/2017 Updated hyperlinks for all references. Added step 5.9 to the “Methods” section to include creating a LIMS label and logging the media into LIMS.

11/16/2018 Changed font from Times New Roman to Calibri. Updated links.

11/12/2020 Updated data archival, references and parameters section

10/29/2021 Updated links.

11/08/2022 Removed SOP TA-06.37 from references and replaced it with SOP TA-06.43, updated links, changed references for Selenium to Sodium Selenate, and checked grammar.

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