Preparation of Selenium Solution for use in 20% DMW

1. SCOPE AND APPLICATION

1.1. This method is based on EPA 821-R-02-012, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, 5th Edition*. It can be used for 20% Dilute Mineral Water (DMW) and Synthetic Moderately Hard Water for *Ceriodaphnia dubia* (MHWCD) and in media for culturing *Pseudokirchneriella subcapitata*.

2. SUMMARY OF METHOD

2.1. Sodium selenate is weighed and added to deionized water to produce a stock solution of sodium selenate. The stock solution is added to deionized water to produce a sodium selenate working solution.

2.2. Definitions:

2.2.1. Sodium selenate - a nutrient for *Ceriodaphnia dubia* (*C. dubia*) that is added to *C. dubia* culture media (20% DMW or MHWCD) at the rate of 1 mL working solution to 1 L of media (2 µg/L selenium).

3. INTERFERENCES

3.1. Contaminated glassware, contaminated sodium selenate, contaminated deionized water, and weighing errors.

3.2. Annually, a sample of stock solution is submitted for chemical analyses. It is usually combined with copper and cadmium toxicity test solutions.

4. EQUIPMENT AND SUPPLIES

4.1. Mettler PB403-S/FACT Balance S/N 1123052001, calibrated per SOP TA-06.31

4.2. Weigh boat, plastic

4.3. Volumetric flasks with stoppers, 1 L, 2 each

4.4. Metal spatula

4.5. Magnetic stirrer

4.6. Stir bar, 2.5 cm

4.7. Stir-bar retriever

4.8. Volumetric pipet, 2 mL

4.9. Squeeze bottle for deionized (DI) water, 500 mL

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5. REAGENTS AND STANDARDS

5.1. Sodium selenate (Na_2SeO_2), ACS grade
CAUTION! Sodium selenate is poisonous, handle with great care

5.2. DI water

6. METHOD

6.1. Label one flask with "Sodium selenate stock, 2.39 g/L, use 2 mL/L to prepare working solution," the batch number and analyst's initials. Label the second flask "Sodium selenate working solution, 2,000 µg/L, use 1mL/L to prepare *C. dubia* media," the batch number, an expiration date of one year from the preparation date (batch number), and analyst's initials.

6.1.1. The "batch number" is the date that the solution(s) is prepared. Format is mm/dd/yy, ex: 01/11/12. Add an expiration date to the label of one year after preparation date (batch number), ex: 01/11/13 for the 01/11/12 batch.

6.2. Half fill the flasks with DI water.

6.3. Weigh out 2.39 ±0.01 g of sodium selenate per SOP TA-06.31, and then place it into the flask labeled "Sodium selenate stock." Use the DI wash bottle to rinse any remaining salt from the weigh boat into the flask.

6.4. Swirl the flask several times to help dissolve the salt.

6.5. Finish filling the selenium stock solution flask to the 1,000 mL mark with DI water.

6.6. If the flask contains evidence of undissolved salt, place a clean stir bar in the flask. Place the flask on the magnetic stirrer and turn the stirrer on. Stir until the salt is dissolved.

6.7. Remove the stir bar with the stir-bar retriever. Rinse the stir bar and the stir bar retriever thoroughly with DI water.

6.8. Use the 2 mL volumetric pipet to take 2 mL of selenium stock solution and add to the flask labeled "Sodium selenate working solution."

6.9. Swirl the flask several times to help mix the solution. Fill the flask to the 1,000 mL mark with DI water.

6.10. Stopper both flasks.

6.11. Record the selenium stock and the selenium working solution preparation batch information in the *Tox Record of Preparation* logbook.

6.12. Store the selenium stock and working solutions in the walk-in refrigerator.

6.12.1. The selenium stock and working solutions may be stored for one year (at temperature >0 and ≤ 6.0 ºC).

7. DATA ARCHIVAL

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

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7.2. Record information in *Tox Record of Preparation* logbook.

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

7.3.1. The corrected entry is written as near its appropriate space as possible or else in the comment box on the appropriate bench sheet.

7.3.2. If the correction requires an explanation, write a comment and reference the error. Initial and date the explanation.

7.3.3. 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.).

8. QUALITY CONTROL

8.1. Refer to QA manual for corrective action and handling out-of-control data.

9. SAFETY/HAZARDOUS WASTE MANAGEMENT

9.1. ***Warning!*** Sodium selenate is poisonous, handle with great care. Read the warning label on the container.

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

9.3. Refer to Bureau Quality Manual for sample disposal (http://www.floridadep.org/labs/library/progplan.htm).

9.4. Refer to the Laboratory Health and Safety Manual and Hazardous Waste Management. https://www.fldepnet.org/content/dear/bureau-laboratories-safety-documents

10. REFERENCES

10.1. EPA 821-R-02-012 Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, 5th Ed. October 2002.

10.2. Calibration and Use of Mettler PB403-S/FACT Balance, DEP SOP TA-06.31.

10.3. Bureau Quality Manual

APPENDIX OF CHANGES

12/20/2007	Added Scope and Application; Summary of Method, and Appendix of Changes. Repaginated document. Deleted two blank rows between Pollution Prevention and Waste Management and Methods.
11/17/2008	Added Interference and Reference sections.
08/13/2013	Reformatted SOP.
02/10/2015	Formatted for 508 compliance.
08/17/2015	Updated links.

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