Preparation of Buffered Dilution Water and Stock Components

1. SCOPE AND APPLICATION

1.1. Buffered dilution water is used during the filtration step of the microbiology analysis process. It is used to ensure the even dispersal of the sample aliquot while passing through the filter, and to rinse the funnels clean of any sample residue. It also helps maintain a stable pH during incubation. Buffered dilution water is also used for the method blanks.

2. EQUIPMENT AND SUPPLIES

2.1. Supplies for stock solutions

- 2.1.1. 1 L Class A volumetric flask
- 2.1.2. 2 L Erlenmeyer flask
- 2.1.3. Milk dilution bottles (20)

2.2. Supplies for Buffered Dilution Water

- 2.2.1. 1 L Class A volumetric flask or graduated cylinder
- 2.2.2. 2 L Erlenmeyer flasks (any even-numbered amount)
- 2.2.3. 250 mL beakers (3)
- 2.2.4. Disposable 5 mL pipette – Check calibration and use per SOP MB-03.3
- 2.2.5. Disposable 2 mL pipette – Check calibration and use per SOP MB-03.3
- 2.2.6. Aluminum foil
- 2.2.7. Diack control

2.3. Equipment

- 2.3.1. Accumet Excel XL 25 Dual Channel pH/Ion meter (S/N XL94005930)
  - 2.3.1.1. Calibrate and use per SOP MB-03.4.
- 2.3.2. Mettler Toledo MS303S balance (S/N B247544008)
  - 2.3.2.1. Calibrate and use per SOP PCR-2.1.
- 2.3.3. Steris Amsco Model #3021 (S/N RG11420101) autoclave
  - 2.3.3.1. Calibrate and use per SOP TA-06.18.
- 2.3.4. Market Forge Sterilmatic Model STM-E (S/N 226939) autoclave
  - 2.3.4.1. Calibrate and use per SOP MB-03.2.
- 2.3.5. Thelco Model #4 Incubator (S/N 22-AH-9), maintained at 35 ± 0.5 °C
- 2.3.6. Low Temperature Incubator Model 815 (S/N WB64710726), maintained at 1-4 °C

3. REAGENTS AND STANDARDS

3.1. KH_2PO_4 (potassium dihydrogen phosphate)

3.2. $MgCl_2 \cdot 6H_2O$ (magnesium chloride)

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3.3. Deionized (DI) water

3.4. *Escherichia coli* (ATCC 11775)

3.4.1. Prepare per SOP MB-03.1

3.5. Double strength Tryptic Soy Broth (TSB 2X) for quality control check

3.5.1. Prepare per SOP MB-02.33.

4. PREPARATION

4.1. Stock KH_2PO_4

4.1.1. In a 1 L Class A volumetric flask, dissolve 34.00 ± 0.01 g ACS-certified potassium dihydrogen phosphate (KH_2PO_4) in 500 mL of DI water. Swirl to completely dissolve the reagent. Dilute to 1 L with DI water.

4.1.2. Adjust the pH to 7.2 ± 0.5 with 1 N NaOH.

4.1.3. Fill 10 milk dilution bottles and cap loosely. Autoclave at 121˚C and 15 psi for 15 min.

4.1.3.1. Record autoclave use (including total autoclave cycle time) in LIMS **Laboratory/Technical/Laboratory Logbook** *Autoclave_Log*.

4.2. Stock $MgCl_2$

4.2.1. In an Erlenmeyer flask, dissolve 81.10 ± 0.01 g ACS-certified magnesium chloride ($MgCl_2 \cdot 6H_2O$) in 1 L DI water. Swirl to completely dissolve the reagent.

4.2.2. Fill 10 milk dilution bottles a cap loosely. Autoclave at 121˚C and 15 psi for 15 min.

4.2.2.1. Record autoclave use (including total autoclave cycle time) in LIMS **Laboratory/Technical/Laboratory Logbook** *Autoclave_Log*.

4.3. Buffered Dilution Water

4.3.1. Using a 1 L Class A volumetric flask or a graduated cylinder, fill an <u>even</u> number of 2 L Erlenmeyer flasks with 1 L DI water each. To each flask, using a 2 mL pipette, add 1.25 mL of stock KH_2PO_4. Using a 5 mL pipette, add 5 mL of stock $MgCl_2$ to each flask. Cover each flask with foil.

4.3.2. For each batch of dilution water, hang a Diack control in one flask. Hang it by the string so that the Diack ampule is partially or completely submerged in the water. Use the foil to secure the string.

4.3.3. Autoclave for 30 minutes at 121˚C and 15 psi.

4.3.3.1. Record autoclave use (including total autoclave cycle time) in LIMS **Laboratory/Technical/Laboratory Logbook** *Autoclave_Log*.

4.3.4. Immediately after removing flasks from autoclave, check the Diack control (see Section 5.2) and pour the contents of half of the flasks into another so that each flask contains 2 L of buffered water.

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4.3.5. Record each preparation in LIMS **Laboratory/Technical/Standard Preparation Tracker**. Record the final pH of stock KH_2PO_4 in Standard Preparation Tracker. Print labels for stocks and buffered water and attach to dilution bottles and flasks when cool.

4.3.6. Store stock solutions in Low Temperature Incubator Model 815 for up to 12 months. If either KH_2PO_4 or $MgCl_2$ becomes turbid before 12 months, discard. Discarded or used up stock solutions and buffered water should also be discarded in LIMS Standard Preparation Tracker. Store buffered water on the cart at the micro filter station for up to 6 months.

5. QUALITY CONTROL

5.1. Buffered Water QC

5.1.1. Before use, run a quality control check on the buffered water. In 2 beakers, make a 1:1 (approx. 25 mL) TSB 2X and buffered water solution. Add *E. coli* to one of the beakers. This is the positive control. The other beaker is the negative control. To check media sterility, add only TSB 2X to a third beaker. Incubate the three beakers at 35˚C ± 0.5˚C for 24 hours.

5.1.1.1. After incubation, if growth occurs (turbidity) in the negative control, repeat the quality control check. If the repeat test fails, discard the prepared rinse water and make a new batch.

5.1.1.2. If growth occurs in the TSB 2X only beaker, repeat the test with new media.

5.1.2. Record the QC check(s) in LIMS **Standard Preparation Tracker**. Use the **Verify Standard** button to document buffered water QC results. In the "Comments" box, copy and paste the comment in document "Buffered Water QC Comment," located in \\fldep1\DEAR\Labs\Lab5\Biology\Bench Common\Micro. Change the serial numbers for both the TSB 2X and the *E. coli* and QC results as necessary.

5.2. Autoclave QC

5.2.1. For each batch of buffered water made, place a Diack control in one of the flasks.

5.2.1.1. If the Diack has been melted after 30 minutes of sterilization, then the autoclave is reaching the proper temperature for the appropriate amount of time. The pellet will not be liquid; it becomes solid as it cools. The shape of the pellet, not a color change, is the indicator.

5.2.1.2. If the Diack has not melted, then discard the batch. Either the autoclave is not working properly or the autoclave may have been set to less than 30 minutes.

**Note: Do not re-autoclave buffered water! This may result in excessive deterioration or decomposition of components.

6. SAFETY/HAZARDOUS WASTE MANAGEMENT

6.1. Refer to the DEP Laboratory Health and Safety Plan.

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6.2. Read MSDS information for reagent handling and disposal.

7. REFERENCES

7.1. DEP Laboratory Quality Manual, http://www.dep.state.fl.us/labs/library/lab_sops.htm

7.2. DEP Laboratory Health and Safety Plan, https://www.fldepnet.org/content/dear/bureau-laboratories-safety-documents

7.3. Standard Methods Online Edition (2006), Section 9050C

7.4. DEP SOP MB-03.3, *Calibration and Use of Mechanical and Disposable Pipettes*

7.5. DEP SOP MB-03.4, *Accumet Excel XL 25 pH Meter Calibration and Use*

7.6. DEP SOP PCR-2.1, *Calibration, Use and Maintenance of Mettler Toledo MS303S Balance*

7.7. DEP SOP TA-06.18, *AMSCO Renaissance Series 3021 Autoclave Calibration and Use*

7.8. DEP SOP MB-03.2, *Market Forge Sterilimatic Autoclave Calibration and Use*

7.9. DEP SOP MB-02.33, *Preparation of Dehydrated Media*

7.10. DEP SOP MB-03.1, *Maintenance of Bacterial Cultures*

Appendix of Changes

08/20/2008	Updated to Standard methods 20th Edition and added a references section.
08/27/2009	Updated QC and Documentation sections and holding times.
08/13/2010	Updated to new version of Health and Safety Plan
08/12/2011	Updated to Bureau quality manual and added specific incubators used.
06/15/2012	Updated to new SOP format and corrected interpretation of Diack control results.
06/03/2013	Updated to reflect use of new balance and added serial numbers.
05/23/2014	Updated to reflect use of new pH meter & added serial number.

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