

## HOAGLAND'S E+ (modified by J. Acreman, CPCC)

Reference: Cowgill, U.M. and Milazzo, D.P. 1989. Aquatic Toxicology and Hazard Assessment. 12th volume. ASTM STP 1027. pp. 379-391.

| STOCK   | STOCK SOLUTION | MEDIUM    |
|---|----------------|-----------|
| 1. MgSO <sub>4</sub> •7H <sub>2</sub> O                 | 24.6 g/100 mL  | 2 mL/L    |
| 2. Ca(NO <sub>3</sub> ) <sub>2</sub> •4H <sub>2</sub> O | 23.6 g/100 mL  | 5 mL/L    |
| 3. KH <sub>2</sub> PO <sub>4</sub>                      | 13.6 g/100 mL  | 5 mL/L    |
| 4. KNO <sub>3</sub>                                     | 10.1 g/100 mL  | 10 mL/L   |
| 5. Fe-Na <sub>2</sub> EDTA•2H <sub>2</sub> O*           | See below      | 20 mL/L   |
| 6. H <sub>3</sub> BO <sub>3</sub>                       | 2.86 g/L       | 1 mL/L    |
| ZnSO <sub>4</sub> •7H <sub>2</sub> O                    | 0.22 g/L       |           |
| Na <sub>2</sub> MoO <sub>4</sub> •2H <sub>2</sub> O     | 0.12 g/L       |           |
| CuSO <sub>4</sub> •5H <sub>2</sub> O                    | 0.08 g/L       |           |
| MnCl <sub>2</sub> •4H <sub>2</sub> O                    | 3.62 g/L       |           |
| 7. Sucrose  |                | 10.00 g/L |
| 8. Yeast extract  |                | 0.10 g/L  |
| 9. Bacto-tryptone<br>OR Bacto-peptone                   |                | 0.60 g/L  |

For one litre of medium start with about 900 ml of distilled water and add each stock solution in the order above. The medium is then stirred until all the contents are dissolved. Adjust the pH to 4.60 with NaOH or HCl and bring volume up to 1 L with distilled water and autoclave. Stock solutions should be stored in the dark (i.e., dark amber or aluminum-covered bottles) due to potential photosensitivity. Stock solutions may be stored in the refrigerator for up to 6 months, provided that they are isolated from solvents or other potential contaminants. Monitor the Fe-Na<sub>2</sub>EDTA solution for precipitate.

\* Fe-Na<sub>2</sub>EDTA solution:

To 1000 ml of distilled water add 1.5 g of Na<sub>2</sub>EDTA•2H<sub>2</sub>O and dissolve completely. Then add 0.48 g of FeCl<sub>3</sub>•6H<sub>2</sub>O and dissolve. This solution may be added directly together with the above stock solutions and autoclaved together with the medium. Alternatively, if medium forms precipitate then autoclave this solution separately and add aseptically after autoclaving both solutions.