

## f/2 Medium

(Guillard and Ryther 1962, Guillard 1975)

This is a common and widely used general enriched seawater medium designed for growing coastal marine algae, especially diatoms. The concentration of the original formulation, termed "f Medium" (Guillard and Ryther 1962), has been reduced by half.

To prepare, begin with 950 mL of filtered natural seawater and add the following components. The trace element and vitamin solutions are provided below. Bring the final volume to 1 liter with filtered natural seawater. If the alga to be grown does not require silica, then it is recommended that the silica be omitted because it enhances precipitation. Autoclave.

Component	Stock Solution	Quantity	Molar Concentration in Final Medium
NaNO <sub>3</sub>	75 g/L dH <sub>2</sub> O	1 mL	8.82 x 10 <sup>-4</sup> M
NaH <sub>2</sub> PO <sub>4</sub> · H <sub>2</sub> O	5 g/L dH <sub>2</sub> O	1 mL	3.62 x 10 <sup>-5</sup> M
Na <sub>2</sub> SiO <sub>3</sub> · 9H <sub>2</sub> O	30 g/L dH <sub>2</sub> O	1 mL	1.06 x 10 <sup>-4</sup> M
trace metal solution	(see recipe below)	1 mL	---
vitamin solution	(see recipe below)	0.5 mL	---

## f/2 Trace Metal Solution

To prepare, begin with 950 mL of dH<sub>2</sub>O, add the components and bring final volume to 1 liter with dH<sub>2</sub>O. Autoclave. Note that the original medium (Guillard and Ryther 1962) used ferric sequestrene; we have substituted Na<sub>2</sub>EDTA · 2H<sub>2</sub>O and FeCl<sub>3</sub> · 6 H<sub>2</sub>O.

Component	Primary Stock Solution	Quantity	Molar Concentration in Final Medium
FeCl <sub>3</sub> 6H <sub>2</sub> O	---	3.15 g	1.17 x 10 <sup>-5</sup> M
Na <sub>2</sub> EDTA 2H <sub>2</sub> O	---	4.36 g	1.17 x 10 <sup>-5</sup> M
CuSO <sub>4</sub> 5H <sub>2</sub> O	9.8 g/L dH <sub>2</sub> O	1 mL	3.93 x 10 <sup>-8</sup> M
Na <sub>2</sub> MoO <sub>4</sub> 2H <sub>2</sub> O	6.3 g/L dH <sub>2</sub> O	1 mL	2.60 x 10 <sup>-8</sup> M
ZnSO <sub>4</sub> 7H <sub>2</sub> O	22.0 g/L dH <sub>2</sub> O	1 mL	7.65 x 10 <sup>-8</sup> M
CoCl <sub>2</sub> 6H <sub>2</sub> O	10.0 g/L dH <sub>2</sub> O	1 mL	4.20 x 10 <sup>-8</sup> M
MnCl <sub>2</sub> 4H <sub>2</sub> O	180.0 g/L dH <sub>2</sub> O	1 mL	9.10 x 10 <sup>-7</sup> M

### f/2 Vitamin Solution

First, prepare primary stock solutions. To prepare final vitamin solution, begin with 950 mL of dH<sub>2</sub>O, dissolve the thiamine, add the amounts of the primary stocks as indicated in the quantity column below, and bring final volume to 1 liter with dH<sub>2</sub>O. At the NCMA we autoclave to sterilize. Store in refrigerator or freezer.

Component	Primary Stock Solution	Quantity	Molar Concentration in Final Medium
thiamine HCl (vit. B <sub>1</sub> )	---	200 mg	2.96 x 10 <sup>-7</sup> M
biotin (vit. H)	0.1 g/L dH <sub>2</sub> O	10 mL	2.05 x 10 <sup>-9</sup> M
cyanocobalamin (vit. B <sub>12</sub> )	1.0 g/L dH <sub>2</sub> O	1 mL	3.69 x 10 <sup>-10</sup> M

Guillard, R.R.L. 1975. Culture of phytoplankton for feeding marine invertebrates. pp 26-60. In Smith W.L. and Chanley M.H (Eds.) *Culture of Marine Invertebrate Animals*. Plenum Press, New York, USA.

Guillard, R.R.L. and Ryther, J.H. 1962. Studies of marine planktonic diatoms. I. *Cyclotella nana* Hustedt and *Detonula confervacea* Cleve. *Can. J. Microbiol.* **8**: 229-239.