

## RECIPE FOR 100% HOAGLAND SOLUTION #1 - ALL NITRATE-N

<u>Stock Concentration/Component</u>		<u>ml per L of final 100% solution/ (final concentration)</u>	
1M KNO <sub>3</sub>	Potassium nitrate	5 ml	(0.005 M)
1M Ca(NO <sub>3</sub> ) <sub>2</sub>	Calcium nitrate	5 ml	(0.005 M)
1M KH <sub>2</sub> PO <sub>4</sub>	Potassium acid phosphate	1 ml	(0.001 M)
1M MgSO <sub>4</sub>	Magnesium sulfate	2 ml	(0.002 M)
	Micronutrient Stock	1 ml	
0.01M Fe-EDDHA	Iron-EDDHA Stock	10 ml	(0.0001 M = 0.1 mM)

Fe-EDDHA using Fe(NO<sub>3</sub>)<sub>3</sub>: see recipe:

- 4.04g Fe(NO<sub>3</sub>)<sub>3</sub>/ 404g/m = 0.01 moles in stock = 10mM in stock
- 10 ml stock into 1L final volume = 1:100 dilution, giving 0.0001 M = 0.1 mM in final solution of 100%

Components of Micronutrient Stock:

<u>Stock Concentration/Component</u>		<u>g per 1L of H<sub>2</sub>O</u>
0.046 M	H <sub>3</sub> BO <sub>3</sub> Boric Acid	2.86 g
0.009 M	Mn Cl <sub>2</sub> ·4H <sub>2</sub> O Manganese Chloride	1.81 g
*7.65·10 <sup>-4</sup>	ZnSO <sub>4</sub> ·7H <sub>2</sub> O Zinc sulfate	0.22 g
*3.2·10 <sup>-4</sup>	CuSO <sub>4</sub> ·5H <sub>2</sub> O Copper sulfate	0.08 g
*1.11·10 <sup>-4</sup>	H <sub>2</sub> MoO <sub>4</sub> ·H <sub>2</sub> O Molybdic Acid (85%)	0.02 g

\* see alternative recipe for making concentrates of these three micronutrients

## RECIPE FOR NITROGEN-FREE SOLUTION

<u>Stock Concentration/Component</u>		<u>ml per L of final 100% solution/ (final concentration)</u>	
0.5M K <sub>2</sub> SO <sub>4</sub>	Potassium sulfate	5 ml	(0.0025 M)
1M CaCl <sub>2</sub>	Calcium chloride	5 ml	(0.005 M)
1M KH <sub>2</sub> PO <sub>4</sub>	Potassium acid phosphate*	0.5 ml	(0.0005 M)
1M MgSO <sub>4</sub>	Magnesium sulfate*	1 ml	(0.001 M)
0.01M Fe-EDDHA	Iron-EDDHA Stock*	10 ml	(0.0001 M = 0.1 mM)
	Micronutrient Stock for -N ‡	1 ml	

**Notes:**

\* same stock solutions as used in N-containing Hoagland solution

‡ use Micronutrient Stock for N-free solutions. This includes:  $1 \cdot 10^{-6}$  g of CoCl<sub>2</sub>·6H<sub>2</sub>O (Cobalt chloride) per 1L of final 100% solution = 0.001 ppm in final solution.

- use 1 ml of  $1 \cdot 10^{-3}$  g/L (=1ppm) CoCl<sub>2</sub>·6H<sub>2</sub>O concentrate in 1L of micronutrient stock
- to make  $1 \cdot 10^{-3}$  g/L (=1ppm) CoCl<sub>2</sub>·6H<sub>2</sub>O concentrate, use 1g CoCl<sub>2</sub>·6H<sub>2</sub>O in 1L ddH<sub>2</sub>O

Reference:

Hoagland, D.R. and D.I. Arnon. 1950. The water-culture method for growing plants without soil. California Agricultural Experiment Station Circular 347:1-32.