

Recipe for Hoagland's Complete Nutrient Solution

This is made essentially according to the following reference: D.R. Hoagland and D.I. Arnon. The water-culture method of growing plants without soil. Calif. Agr. Expt. Sta. Circ. 347. 1950. There is one change and that is in the form of iron added.

Prepare the following stock solutions (1-6) and use the amounts indicated to prepare 1 liter (final volume) of nutrient solution:

1. 1.00 M $\text{NH}_4\text{H}_2\text{PO}_4$ use 1 mL/L of nutrient solution
2. 1.00 M KNO_3 use 6 mL/L of nutrient solution
3. 1.00 M $\text{Ca}(\text{NO}_3)_2$ use 4 mL/L of nutrient solution
4. 1.00 M MgSO_4 use 2 mL/L of nutrient solution

Micronutrient stocks: combine the following amount of salts in a total volume of one liter of water, and then use 1 mL/L of this entire stock mixture (5) along with the stocks above (1-4) and the iron stock (6) described below to make up a total of 1 L of nutrient solution.

5. 2.86 gm H_3BO_3
1.81 gm $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$
0.22 gm $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$
0.08 gm $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
0.02 gm $\text{H}_2\text{MoO}_4 \cdot \text{H}_2\text{O}$

(Assaying 85% MoO_3)

6. Iron stock: to the above 5 stocks add 0.25 ml of this iron stock for 1 liter of nutrient solution.

To make up the iron stock, take 26.1 g EDTA and dissolve in 286 ml water that has ~19 g KOH . Then dissolve 24.9 $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ in ~ 500 ml water. Slowly add the iron sulfate solution to the potassium EDTA solution and aerate this solution overnight with stirring. The pH rises to about 7.1 and the solution is wine red and very little precipitation occurs. Make to 1 liter final volume and store in a bottle covered with foil (dark).

Note: Hoagland's recipe called for 1 ml of 0.5% iron tartrate stock per liter of nutrient solution but we use the above substitution.

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