MIXING CHEM-GRO™ FERTILIZER FORMULAS

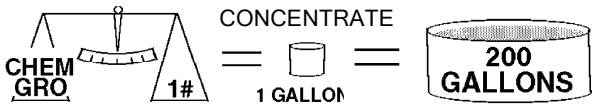
READ THE INSTRUCTIONS ON THE PAGE OF THE CATALOG/INTERNET OF THE FORMULA YOU ARE USING TO INSURE YOU ARE MIXING THE CORRECT FORMULA FOR THE STAGE OF THE SPECIFIC CROP AND VARIETY BEING GROWN.

DO NOT CHANGE THE PROCEDURE THAT IS DESCRIBED BELOW

There are a three ways to obtain dilute (plant usable) nutrient solution: (1) Mix the dry powder in a large capacity holding (sump) tank; (2) make nutrient concentrates that will be transferred to a holding tank; (3) make nutrient concentrates that will be diluted with a fertilizer injector. We believe the following instructions will clarify how to handle each situation.

MAKING DILUTE (PLANT USABLE) FERTILIZER IN A HOLDING (SUMP) TANK

1) Determine the volume of the holding tank (100, 500, 1,000 gallons, etc.) **1 cubic foot is 7.48 gallons.**
2) Clean out the residue in the holding tank.
3) Fill the holding tank with water.
4) Use a submersible pump or other device and begin stirring the water.
5) Weigh out the correct amount of Chem-Gro™ fertilizer, Calcium Nitrate, and Magnesium Sulfate for each 100 gallons of water according to the instructions on the page of the fertilizer you are using for the crop you are growing.
6) Slowly add the Chem-Gro™ **powder** to the holding tank.
7) Slowly add the Calcium Nitrate to the holding tank.
8) Slowly add the Magnesium Sulfate to the holding tank.
9) Allow the stirring device to run another 1/2 hour and turn it off.
10) Check the pH and conductivity of the nutrient solution and adjust accordingly. Make a note of the adjustments made so you can duplicate the amounts.
11) Because of the complexity of fertilizer components needed to make Chem-Gro™ a complete nutrient, you may get some sediment each time you make nutrient. Source water composition and quality can also increase the amount of sediment. This sediment is **not** "lost" fertilizer, and it is **not** necessary to continuously stir the nutrient solution in the holding tank. That which has not dissolved will probably not dissolve. You should stir the tank for a few minutes each day to prevent fertilizer stratification. Then simply repeat step 2 as often as necessary to keep the holding tank relatively clean.

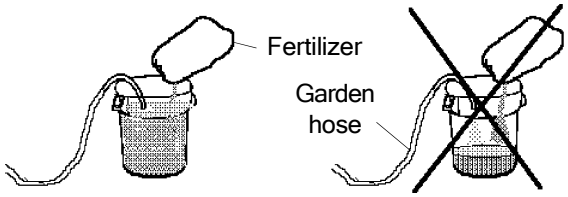


CHEM-GRO™ 10-8-22 CAN NOT BE MADE INTO A CONCENTRATE

THE QUALITY OF YOUR SOURCE WATER MAY REQUIRE MORE CONCENTRATE TANKS

MAKING CONCENTRATED FERTILIZER IN TWO CONCENTRATE TANKS

1) Determine the volume of the concentrate tank (5, 10, 50 gallons, etc.) **1 cubic foot is 7.48 gallons.**
2) Clean out any residue in the concentrate tank.
3) Fill the 1st concentrate tank 3/4ths full with water.



4) Use a submersible pump or other device and begin stirring the water.
5) Weigh out a maximum of 1 lb. of Chem-Gro™ fertilizer for each gallon of water. The injector ratio determines quantity.
6) Slowly add the Chem-Gro™ **powder** to the concentrate tank.
7) Weigh out the correct amount of Magnesium Sulfate needed for each 100 gallons of water according to the instructions on the page of the fertilizer you are using. You should also take into account the magnesium content in your source water.
8) Slowly add the Magnesium Sulfate to the 1st concentrate tank.
9) Add enough water to fill the concentrate tank to the volume calculated in step 1.
10) Allow the stirring device to run another 10 minutes or until it appears that all of the fertilizer has dissolved.
11) Repeat steps 1 thru 4 for the 2nd concentrate tank.
12) Weigh out 1 lb. of Calcium Nitrate for each gallon of water.
13) Slowly add the Calcium Nitrate to the concentrate tank.
14) Add enough water to fill the concentrate tank to the volume calculated in step 1.
15) Allow the stirring device to run another 10 minutes or until it appears that all the Calcium Nitrate has dissolved. (Calcium Nitrate in bead form may be coated with parafin wax. This may make a "scum" form in this tank. Skim this material off the top of the water.)
16) **You should only make enough concentrate to last 2 to 4 weeks. The concentrate tanks may require additional fertilizer adjustments during the life of the crop, and it is easier to do this with a "fresh" batch of concentrate.**
17) If your dilute solution requires additional acid, it should be added to tank #1 before the fertilizer is added.

Fertilizer will dissolve more quickly in warm water than in cold. Do not exceed 70°F.
1/4th teaspoon of Chem-Gro dissolved in 1 gallon of distilled water will be about 300 ppm.

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ADJUSTING CHEM-GRO FERTILIZER FORMULAS FOR INJECTORS

FIXED RATIO INJECTORS - 1:100

Determine the quantity of the fertilizers you will need from the instruction page on that particular Chem-Gro™ formula. Plant fertilizer requirements change as the plant matures. A 1:100 injector will add 1 gallon of concentrate to 100 gallons of water. Therefore, each gallon of concentrate must contain sufficient fertilizer to make 100 gallons of plant useable fertilizer solution. To determine how much fertilizer will be dissolved in EACH GALLON of concentrate: look at how much is mixed into 100 gallons of plant usable formula.

EXAMPLE: 4-18-38 for **seedling plants:**	1 x 8 oz. of 4-18-38 =	8 oz. per gallon
(A minimum of two tanks and	1 x 4 oz. of $CaNO_3$ =	4 oz. per gallon
two heads are required.)	1 x 4 oz. of $MgSO_4$ =	4 oz. per gallon

To determine the weight of each compound to add to the concentrate tank for any number of gallons of concentrate, multiply the amount per gallon listed above by the number of gallons you are going to make.

EXAMPLE: 20 gallons of concentrate:	8 oz. of 4-18-38 x 20 gallons =	160 oz. =	10 lbs.
(A minimum of two tanks and	4 oz. of $CaNO_3$ x 20 gallons =	80 oz. =	5 lbs.
two heads are required.)	4 oz. of $MgSO_4$ x 20 gallons =	80 oz. =	5 lbs.

Remember that ONE GALLON of concentrate will make 100 GALLONS of plant useable fertilizer.

Thus 20 gallons of concentrate will make 2,000 gallons of fertilizer for the plants. If you know how much is required each day by all the plants you have, you can determine how much concentrate to make based on how long you plan to use this particular strength of fertilizer solution.

ADJUSTABLE RATIO INJECTORS: (1:150; 1:190; etc.)

The injector ratio is given as the maximum amount the injector heads can deliver. These ratios can be adjusted down from this maximum. The normal plant useable solution strength of 4-18-38 is 1/2 lb. (8 oz.) per 100 gallons of water. The multiplier you will use is calculated by dividing the injector ratio by 100. This multiplier is used to determine the amount of fertilizer required in your concentrate solution to make the number of gallons of plant useable fertilizer as listed by the ratio of the injector. The second thing you need to know is how many pounds of fertilizer are in each GALLON of concentrate. If we assume you use a 50 gallon concentrate tank, and full bags of fertilizer, your concentrate tanks would contain:

2 @ 4-18-38 at 25 lbs. per bag in 50 gallons of water is 1 POUND PER GALLON.
2 @ $CaNO_3$ at 50 lbs. per bag in 50 gallons of water is 2 POUNDS PER GALLON.
2 @ $MgSO_4$ at 50 lbs per bag in 50 gallons of water is 2 POUNDS PER GALLON.

Using 4-18-38 for **mature plants** as an example, the head settings will be:

1:150 RATIO INJECTOR

$$\frac{\text{8 oz. of 4-18-38 x 1.5 multiplier}}{\text{16 oz. (1\#) in each gallon}} = \text{7.5 head setting} \qquad \frac{\text{8 oz. of } CaNO_3 \text{ x 1.5 multiplier}}{\text{32 oz. (2\#) in each gallon}} = \text{3.8 head setting}$$

$$\frac{\text{5.33 oz. of } MgSO_4 \text{ x 1.5 multiplier}}{\text{32 oz. (2\#) in each gallon}} = \text{2.5 head setting}$$

1:190 RATIO INJECTOR

$$\frac{\text{8 oz. of 4-18-48 x 1.9 multiplier}}{\text{16 oz. (1\#) in each gallon}} = \text{9.5 head setting} \qquad \frac{\text{8 oz of } CaNO_3 \text{ x 1.9 multiplier}}{\text{32 oz. (2\#) in each gallon}} = \text{4.8 head setting}$$

$$\frac{\text{5.33 oz. of } MgSO_4 \text{ x 1.9 multiplier}}{\text{32 oz. (2\#) in each gallon}} = \text{3.2 head setting}$$