

Chemical Incompatibilities:

Why and How to Avoid Them

by Donald Lester

Every day more and more new products are coming into the market, each with a different chemistry or mode of action.

With production costs spiraling upward growers are forced to be as efficient as possible in the delivery of these materials to their plants. So it is common for growers to try and mix several products in one tank rather than apply separate foliar applications or soil drenches. This is where problems, particularly chemical incompatibilities, can arise.

Incompatibility in chemicals is quite common. Perhaps the most familiar example is our doctor or pharmacist warning us of possible drug interactions with the medications we take. The "Wiley Guide to Chemical Incompatibilities" lists over 9,000 incompatible chemical combinations. Of course, not all of these materials are used in garden, greenhouse or hydroponic products. But, this figure does give us some idea of the scope of the problem. And the problem of chemical incompatibility is getting worse because as the economy declines growers start looking for more all-in-one products to reduce application expenses. Generally, these products already have several ingredients in them so the chances of having incompatibility increases with the addition of more products.

"The 'Wiley Guide to Chemical Incompatibilities' lists over 9,000 incompatible chemical combinations."

Chemical incompatibility can manifest itself in many different ways: cloudiness in the mixture; precipitation or settling out of solids in the tank; formation of noxious or toxic fumes; excessive heat or fire; explosion; production of corrosive materials; formation of solids or films inside tanks and lines; ruptured containers; and plant phytotoxicity (i.e. burning) once the new mixture is applied.

Mixes that settle out or become cloudy are insoluble and unavailable to the plant. Moreover, these deposits can clog dripper lines, plug filters and screens and degrade pump performance, not to mention the added headache of having to shut down the system and painstakingly clean each component.



WHICH FILTER COMPANY WOULD MAKE HELL FREEZE OVER TO GIVE YOU THE BEST GROW?



VOTED BEST FILTER

FOR NASTY ODOR REMOVAL

**AVAILABLE THROUGH HYDROFARM IN THE USA
INTERNATIONAL GROWERS SUPPLY, INC. USA**

WWW.PHATFILTER.COM

Precipitation (sedimentation) can occur because of a chemical reaction, or it can be caused by oversaturation where no chemical reaction takes place. For example, when we mix salt in water we can dissolve only so much salt. After we reach the saturation point any salt added will remain undissolved in the water. The amount of dissolvability remaining in a liquid is often referred to by formulators as how much “room” is left. If there is enough room then we can mix something else into the solution and have it all dissolve leaving a clear solution. If we run out of room then we get precipitation. This type of precipitation can often be overcome by mixing the first product in a large volume of water and then adding the second product afterward. External influences can have an impact on sedimentation too. The temperature of the air has an influence on sedimentation.

The warmer a fluid is the more solids it can dissolve. Conversely, as a fluid gets colder it can hold less in solution (i.e. dissolve less solids). So, some tank mixes cannot be allowed to cool below a certain temperature point otherwise precipitation takes place.

“The ‘jar test’ is a quick method for determining if products are compatible.”

The main way to avoid these problems is to read the product labels for known incompatibilities. Manufacturers try to test the most likely tank mixes of their products and give recommendations for those mixes. But manufacturers cannot test every combination of their product with all the other products on the market. It is simply not practical. This is why you will often see on chemical labels a recommendation to perform a “jar test”

before mixing large quantities of product.

The “jar test” is a quick method for determining if products are compatible. This simple test is performed by

taking a clean glass jar and mixing the two (or more) products straight from the bottle in concentrated form. If precipitation is going to take place it will happen faster with concentrated chemicals. This simple test often helps growers avoid a tank full of useless liquid with a layer of sludge on the bottom, and a potential disposal problem.

As a rule of thumb you can reasonably expect a reaction in the jar test if the two (or more) products have drastically different pH values. When I say drastically different I mean a difference of at least two pH units. You can usually find the pH values of the products on their respective Material Safety Data Sheets (MSDS). These forms are available from the manufacturer and are usually posted on their websites for download.

The pH of the water used for dilution can make a big difference in how chemicals react with each other. Sometimes an incompatibility between two chemicals can be made workable by adding an acidifier or water conditioning product. If the water pH is not near 7.0 then there is a good chance you will have to treat the water first to adjust the pH before making your tank mix. In general it is

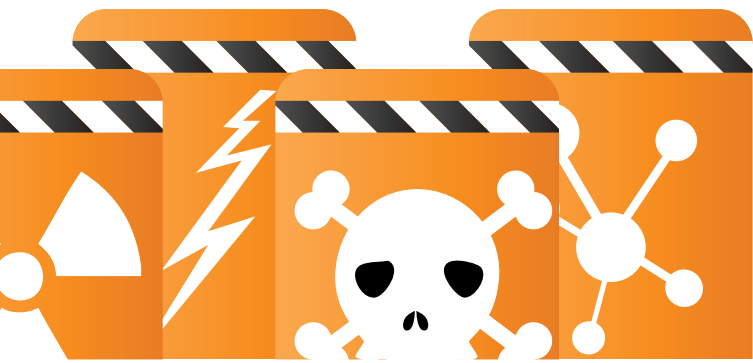




better to adjust the pH of the water first rather than try to correct the solution pH once everything is mixed together.

A common sense measure that often goes overlooked is proper cleaning of the mixing tank before starting a new mixture. Be sure the mixing tank has been cleaned well. I know of several people who have experienced a chemical incompatibility problem because they added products to a tank that still had chemical residues inside. Even small amounts of some chemicals can cause big problems in the right combination.

In some complex mixes it may be necessary to mix the ingredients in a particular order or sequence. Sometimes you will see these sequences given on the label for more popular mixes that use tricky combinations of materials. Product manufacturers usually have highly trained chemists on staff who can guide you through these types of mixes. Go directly to the manufacturer for this type of advice because distributors and retailers usually do not have chemists on staff for this type of assistance. You can also consult



WHICH INDOOR TENT COMPANY WOULD MAKE FAT LADIES SING TO GIVE YOU THE BEST GROW?

Silver Edition BY Hydrohuts

PORTABLE INDOOR GREENHOUSE

NOW AVAILABLE IN:
 2'x4', 3'x3', 4'x4', 5'x5',
 4'x6', 4'x8', 10'x10'

Our Customer Service Will Leave You Satisfied!

International Growers Supply, Inc.

www.hydrohuts.com

“If precipitation is going to take place it will happen faster with concentrated chemicals.”

university experts, usually free of charge, to help with troubleshooting. In some cases a chemist, or the label, will advise you to add one product to a large volume of water first before adding a second product. Sometimes this dilution with water will slow the chemical reaction enough so that the mixture can do its work in the plants before the reaction takes place. This is why you will see on some product labels that the mixture must be used within 24 or 48 hours of mixing.

Many sophisticated growers like the flexibility of creating their own special blend rather than buying generic off-the-shelf, one-size-fits-all products. And growers tend to stick with mixes they know will work for them. In having gone through the process of finding that right mix growers invariably encounter product



Left: Water at the correct pH dissolves the materials to form a clear solution. Right: When a calcium product is added to high pH water, a cloudy, insoluble precipitate forms.

incompatibilities. This may be one reason why beginners are intimidated with the chemistry of plant products. But if you read the labels; compare the pH values of the products; perform the jar test; check the pH of your water; and seek qualified assistance from the manufacturer; you can avoid many of the more common chemical incompatibility problems and create tank mixes that are right for your operation.

MY



New!
FLAVORLESS



SWEET RAW

FLAVORLESS ALL NATURAL MINERAL SUPPLEMENT
ALL THE BENEFITS OF THE ORIGINAL SWEET™ FORMULAS
WITHOUT ADDED FLAVORS

- Sturdy stems and healthy leaves
- Seamless transitions between growth phases
- Maintains balanced metabolism
- Helps balance respiration and photosynthesis
- Enhances your plants' natural flavors and aromas
- Hardy plants with shorter internodes.



8 oz 1 QT 1 GAL 2.5 GAL 5 GAL

