

# Careful, When Blending Fluid Fertilizers

*Compatibility can be a problem for many blends.*

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**B**ecause blending of fluid fertilizers can be tricky, even for those experienced in the business, compatibility is always a major concern. The color blend chart shown on the next page lists a number of products available on the market today and their compatibility. Each product on the chart will be distinguished by a different color, indicating compatibility, limited compatibility, very limited compatibility, and incompatibility. White cells on the lower right of the chart indicate dry materials.

A cautionary note found in this chart is that it is based on opinions of people in the fluid fertilizer industry and that the information is compiled only as a general guide. Neither the Fluid Fertilizer Foundation nor contributors guarantee the accuracy of the information. Reference should be made to manufacturer/supplier product information and a small jar test performed prior to final mixing.

## Product by color

**Green** indicates that these products are generally considered to be fully compatible with one another. However, in situations where a new source/supplier for a product is considered, a jar test is recommended at ratios that will be used in the final blend. Products may differ somewhat in composition even though they are the same general product.

**Yellow** indicates products that are generally compatible with one another within solubility limits. For example, UAN solution and potassium thiosulfate can be mixed together as long as temperatures remain high but when temperatures begin to cool, potassium nitrate crystals will form, which have a lower solubility (higher salt-out temperature) than either of the materials used to make the blend. The addition of water will often bring these blends back into solution (lower salt-out temperatures) but too much water may render them uneconomical



for grower or dealer use. Products such as potassium chloride have an endothermic reaction and can lower temperatures of mixes past the salt-out point. By slowly adding and mixing, some problems can be avoided. Acidic type products have an exothermic effect when added to water or a liquid solution, so caution should be used when considering these types of blends (pyramid symbol) due to the amount of heat generated.

**Blue** means limited compatibility. Some blends will produce precipitates that are difficult if not impossible to bring back into solution, resulting in only limited compatibility. For example, combining ammonium sulfate and potassium chloride at relatively low concentrations will form potassium sulfate, which has a much lower solubility than either potassium chloride or ammonium sulfate alone. This will result in the precipitation of potassium sulfate, and sparging or acid addition will not easily bring it back into solution. Other products may have only very limited compatibilities because of other precipitation issues or free ammonia loss.

**Red** indicates incompatibility resulting from relatively insoluble precipitate formation, blend instability, and/or the formation of a hazardous combination. These blends should not be considered for the production of suitable blends. Notice that there are more red cells on the chart than there are green ones.

**White** cells on the lower right of the chart indicate dry materials. Some dry products can be added to fluids with little or no additional water. For example, dry urea can be added to ammonium thiosulfate to increase the nitrogen content of that product or to reduce the sulfur-to-nitrogen ratio. The downside to these types of blends is that the salt-out temperature will increase, thus jar testing is highly recommended. Other white cells with a question mark indicate that little or no information was found for these combinations.

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	Anhydrous Ammonia	Aqua Ammonia	Urea Solution	Ammonium Nitrate Solution	UAN Solution	Ammonium Sulfate Solution	Ammonium Polyphosphate Solution	Ammonium Chloride Solution	Ammonium Thiosulfate	Potassium Thiosulfate	Calcium Thiosulfate	Magnesium Thiosulfate	Calcium-Ammonium Nitrate Solution	Calcium Nitrate Solution	Potassium Carbonate Solution	N-pHuric 28/27	N-pHuric 15/49	N-pHuric 10/55	Water	Nitric Acid	Phosphoric Acid (white)	Phosphoric Acid (green)	Sulfuric Acid	Urea	Ammonium Nitrate	Calcium Nitrate	Potassium Chloride	Potassium Nitrate	Magnesium Nitrate	Technical Grade MAP	Monopotassium Phosphate	PeKacid
Anhydrous Ammonia ; 82-0-0																																
Aqua Ammonia; 20-0-0	Δ																															
Urea Solution; 23-0-0	Δ																															
Ammonium Nitrate Solution; 20-0-0	Δ																															
Urea Ammonium Nitrate Solution; UAN 28/32-0-0	Δ																															
Ammonium Sulfate Solution; 8-0-0-9S	Δ	Δ																														
Ammonium Polyphosphate Solution; 10-34-0	Δ	Δ																														
Ammonium Chloride Solution; 6-0-0-16Cl	Δ																															
Ammonium Thiosulfate Solution; ATS, 12-0-0-26S	Δ																															
Potassium Thiosulfate Solution; KTS, 0-0-25-17S																																
Calcium Thiosulfate; CaTS, 6%Ca 10%S																																
Magnesium Thiosulfate; MgTS, 10%S 4%Mg																																
Calcium-Ammonium Nitrate Solution; 17-0-0 8.8Ca																																
Calcium Nitrate Solution; 8-0-0-11Ca																																
Potassium Carbonate Solution; 0-0-32																																
N-pHuric 28/27; 28-0-0-9S		Δ																														
N-pHuric 15/49; 15-0-0-16S		Δ																														
N-pHuric 10/55; 10-0-0-18S		Δ																														
Water	Δ																															
Nitric Acid	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
Phosphoric Acid (white)	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
Phosphoric Acid (green)	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
Sulfuric Acid	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
Urea; 46-0-0																																
Ammonium Nitrate; 34-0-0																																
Calcium Nitrate; 15.5-0-0-19Ca																																
Potassium Chloride; 0-0-62																																
Potassium Nitrate; 13-0-46																																
Magnesium Nitrate; 10-0-0-9Mg																																
Monoammonium Phosphate (Technical, 12-61-0)																																
Monopotassium Phosphate (0-52-34)																																
PeKacid (0-60-20)																																

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Compatible	'Compatible', results in generally acceptable mixture.
Limited Compatibility	'Limited Compatibility', generally compatible within solubility limits.
Very Limited Compatibility	'Very Limited Compatibility', generally unsuitable mixtures.
Incompatible	'Incompatible', unsuitable mixture and/or hazardous combination.
Δ	Significant heat generated.

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