

Fluid Fertilizer Foundation Technology Workshop Ortho/Low Poly Products, Production & Characteristics

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AgriBusiness

High Quality NPK's



6-2-4-6

4-16-16

High Quality NPK's: "The Goal"

- Seed Safe
- Low Salt Index
- Uniquely Targeted Ortho/Poly Content
 - (specific to the immediate agricultural need)
- Non-Corrosive
- Long Shelf Life / Storage Capacity
- Compatibility: Blending Potential
- Ability to hold other Micronutrients
 - (100% EDTA, EDDHA Chelated, and Sulfate forms of Micronutrients)
- Diverse Application Methods

High Quality NPK: Physical Properties

	3-18-18	4-16-16	LP 6-24-6	MP 6-24-6
рН	7.4-7.8	7.6-7.8	6.3-7.0	6.3-7.0
% Ortho-Phos	100	100	80	50
% Poly-Phos	0	0	20	50
Salt Index	10	11	12	12
Weight (Ibs/gal)	11.7	11.4	11.1	11.1
Specific Gravity	1.410	1.360	1.340	1.330
Appearance	Water White	Water White	Translucent Green	Translucent Green
Odor	No Odor	No Odor	No Odor	No Odor
Prohibited Storage	Aluminum	Aluminum	Aluminum Mild Steel	Aluminum Mild Steel
Freeze Point	-2°F	0°F	5°F	5°F

Fundamental Chemistry

Base chemical reactions:

1) $2H_3PO_4 + 3KOH \rightarrow KH_2PO_4 + K_2HPO_4 + 3H_2O + Heat$

PPAPotassium
HydroxideMono Potassium
PhosphateDi Potassium
PhosphateWaterHeat

2) $NH_3 + KH_2PO_4 \rightarrow KNH_4HPO_4 + Heat$

Ammonia Mono Potassium Phosphate Di Basic Potassium Ammonium Phosphate Heat

Note! Dissolution of Urea:

- The addition of Urea does not participate in the chemical reaction.
- The dissolution of Urea is slightly endothermic.
- Once dissolved, the Urea will remain in solution regardless of pH or temperature.

Salting Potential (if misformulated)



Over Ammoniation



Ammonia Sparger: Salting - Ammonium Phosphate Crystals

Keeping the System Clean

• Bag Filters catch any solids, particulates or contaminates that are typically introduced from the dry urea source.





Correlation: Low Polys & Storage

If the mass temperature of LP 6-24-6 is allowed to climb and then be held above ~100° F, the material will become a soft-set jell and increasing take a harder set over time.







Even with aggressive agitation, once this material jells, it will not return to a full fluid state.

Superior MP 6-24-6 High Quality NPK: (when properly formulated) Stored in North Dakota in excess of 2½ Years



Mid-Poly 6-24-6 Bottom Top

3-18-18

Agribusiness

Technical Review! Salt Index & Calculations

- SI Relation of the extent a fertilizer increases the osmotic pressure of a soil compared to Sodium Nitrate (NaNO₃).
 - Greater the SI value, the greater
 <u>potential</u> damage to the seed/plant
 - Fertilizer formulations &/or blends with SI above 20 are not recommended near the seed

SI Values				
3-18-18	10			
4-16-16	11			
6-24-6	12			
10-10-10	19			
<u>10-34-0</u>	20			
11-52-0	27			
Ammonia	47			
UAN 32	71			
Urea	74			

Ortho vs Poly Phosphate

"Plants can absorb P into their roots in both the orthophosphate and polyphosphate forms, but normally as orthophosphate due to the smaller molecule size."

This statement certainly, reaffirms the selection of high ortho products for use as a foliar! at the same time, it may make an argument for the use of mid-poly phosphates in starter and pop-up applications! Let's read on. Next slide!

Dr. Thomas L. Jensen, Northern Great Plains Director, IPNI, *Plant Nutrition TODAY*

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"In the soil, polyphosphate converts to orthophosphate by hydrolysis (reaction with water). The time required for polyphosphate hydrolysis to occur varies with soil conditions and temperature, and is accomplished by both chemical and biological reaction of polyphosphates with water. *Temperature has a great effect on increasing the rate of hydrolysis* with the amount of hydrolysis being 42%, 63%, and 84% after 72 hours, respectively, at 5°, 20°, and 35° C (41°, 68°, and 95° F). Under cool, dry conditions, hydrolysis may take longer. *The efficiency of polyphosphates with more than 80% water solubility is considered to be equal to, but not better than, orthophosphates.*"

When used as a starter/pop-up, elevated poly will be slightly slower to convert to ortho Phosphate, which means, **as the seed begins to germinate and grow the phosphate nutrient is becoming available to the plant in the early stages of development!**

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"Polyphosphate-containing fertilizers are generally as effective as orthophosphate fertilizers." And, some may argue "more effective"

And, some may argue "more effective" when used as in starter /pop-up applications!

Dr. Thomas L. Jensen, Northern Great Plains Director, IPNI, *Plant Nutrition TODAY*

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3-18-18 Blending with UAN 32









Add Water to Resolve Turbid Appearance or Dissolve Residual Solids





