Fluid Fertilizer Foundation:

Technology Roundup

11-37-0 vs 10-34-0,

Ortho vs Poly Products,

Production & Storage Characteristics

Del Butler

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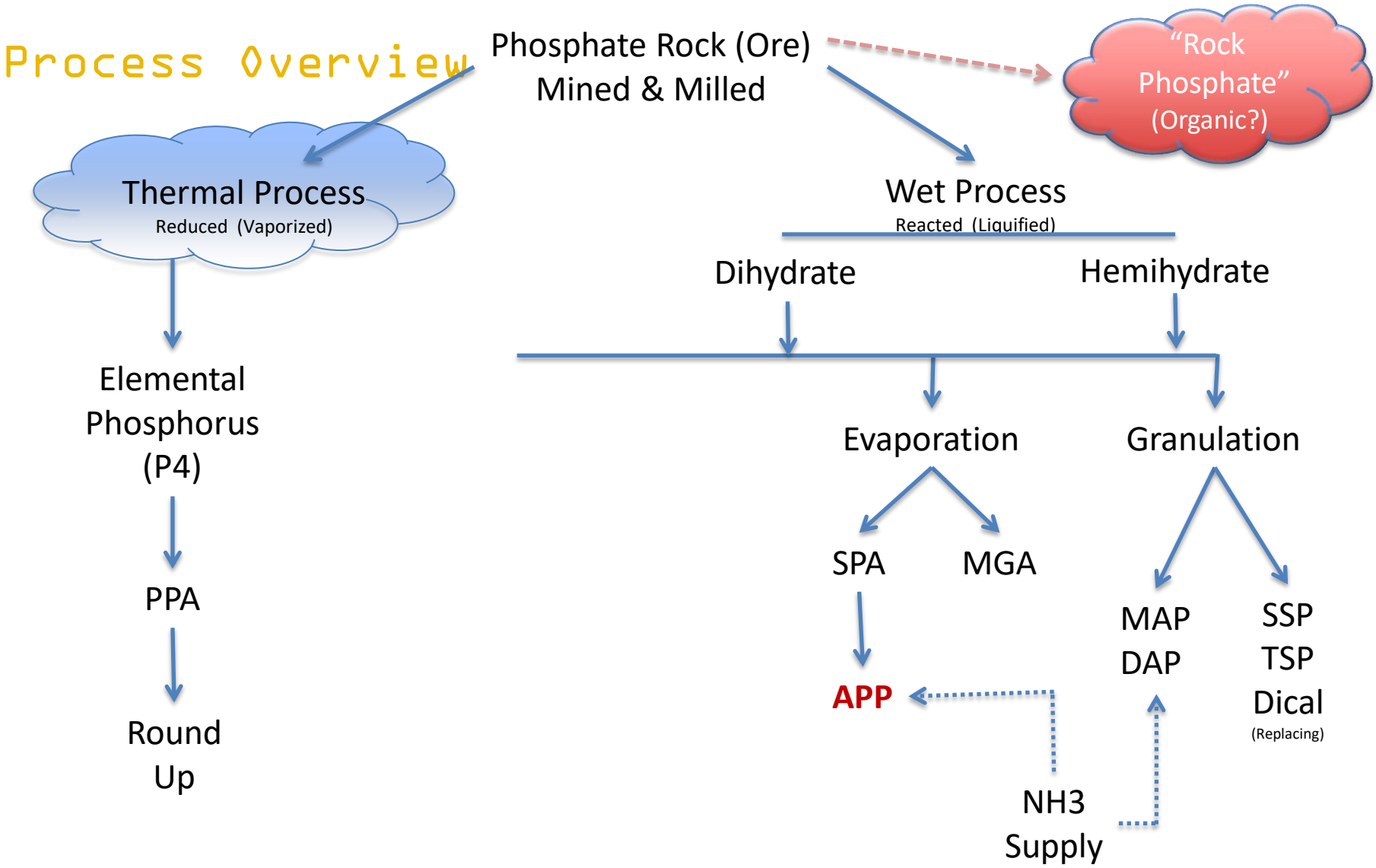
Simplot AGRIBUSINESS

Process Overview



High Quality Ammonium Polyphosphate: *"The Goal"*

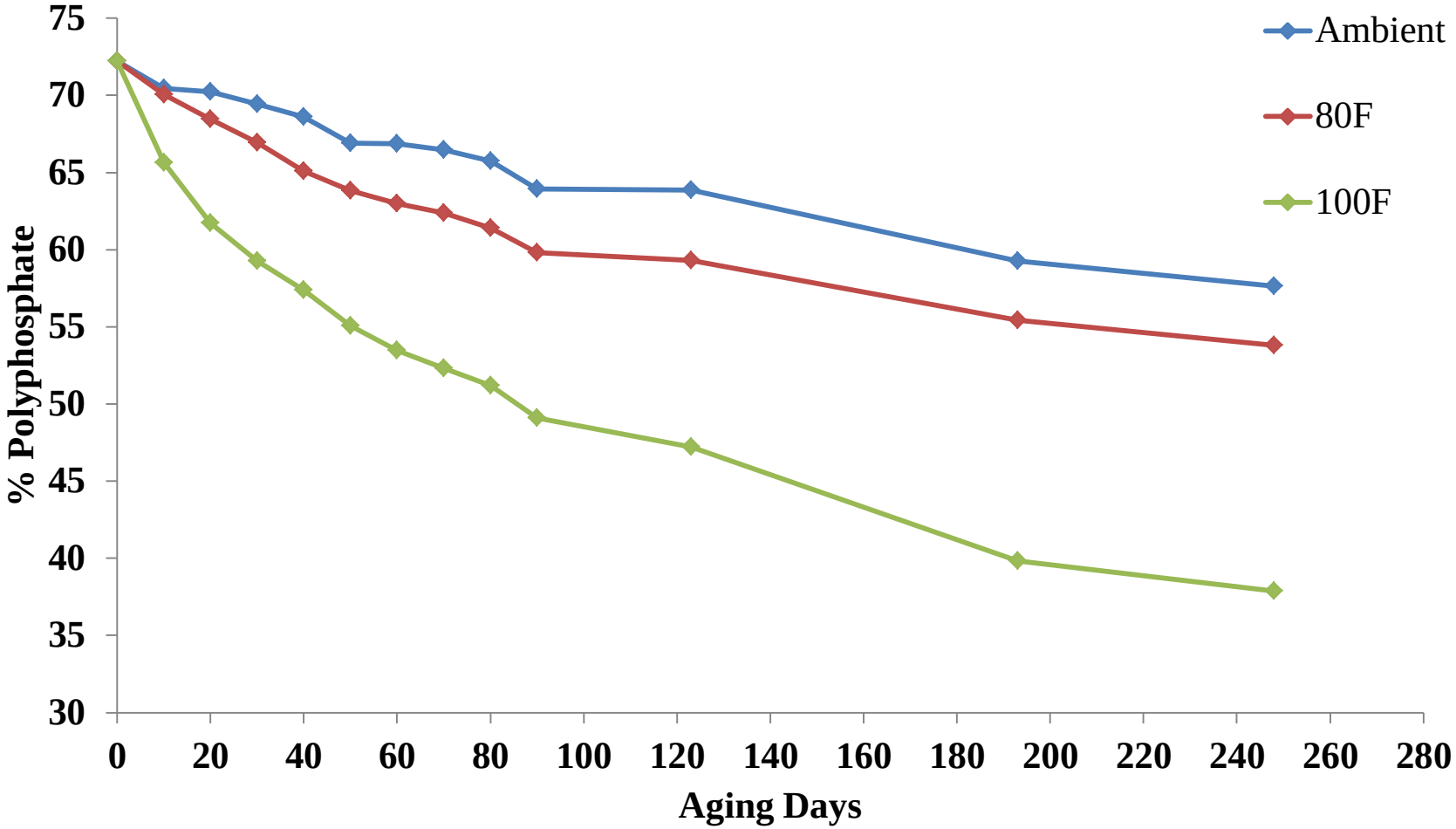
- Non-Corrosive
  - Understanding Passivation
- Long Shelf Life / Storage Capacity
- Diverse Application Methods
  - Safe in Band Applications
  - Compatibility: Blending Potential
  - Ability to hold other Micronutrients
  - Ect.

High Quality APP: Physical Properties

	10-34-0	11-37-0		
pH	6.2	6.1		
% Ortho-Phos	30	30		
% Poly-Phos	70	70		
Salt Index	20	22		
Weight (lbs/gal)	11.6	12.0		
Specific Gravity	1.390	1.440		
Appearance	Emerald Green	Emerald Green		
Odor	Little to No Odor	Little to No Odor		
Non-Recommended Storage	Aluminum	Aluminum		
Freeze Point	N.A.	N.A.		

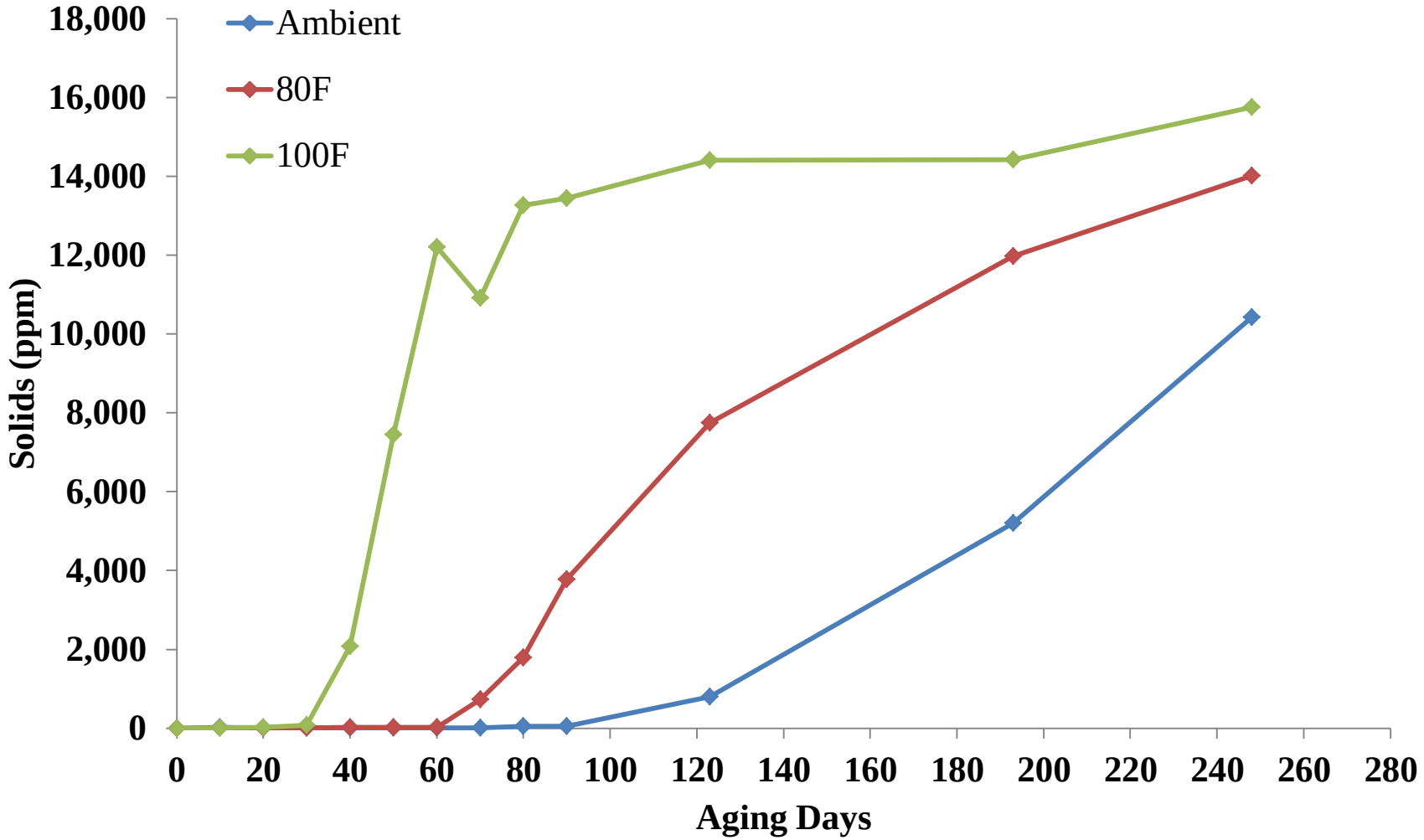
11-37-0 Poly Degradation in Storage

(in a lab controlled environment)



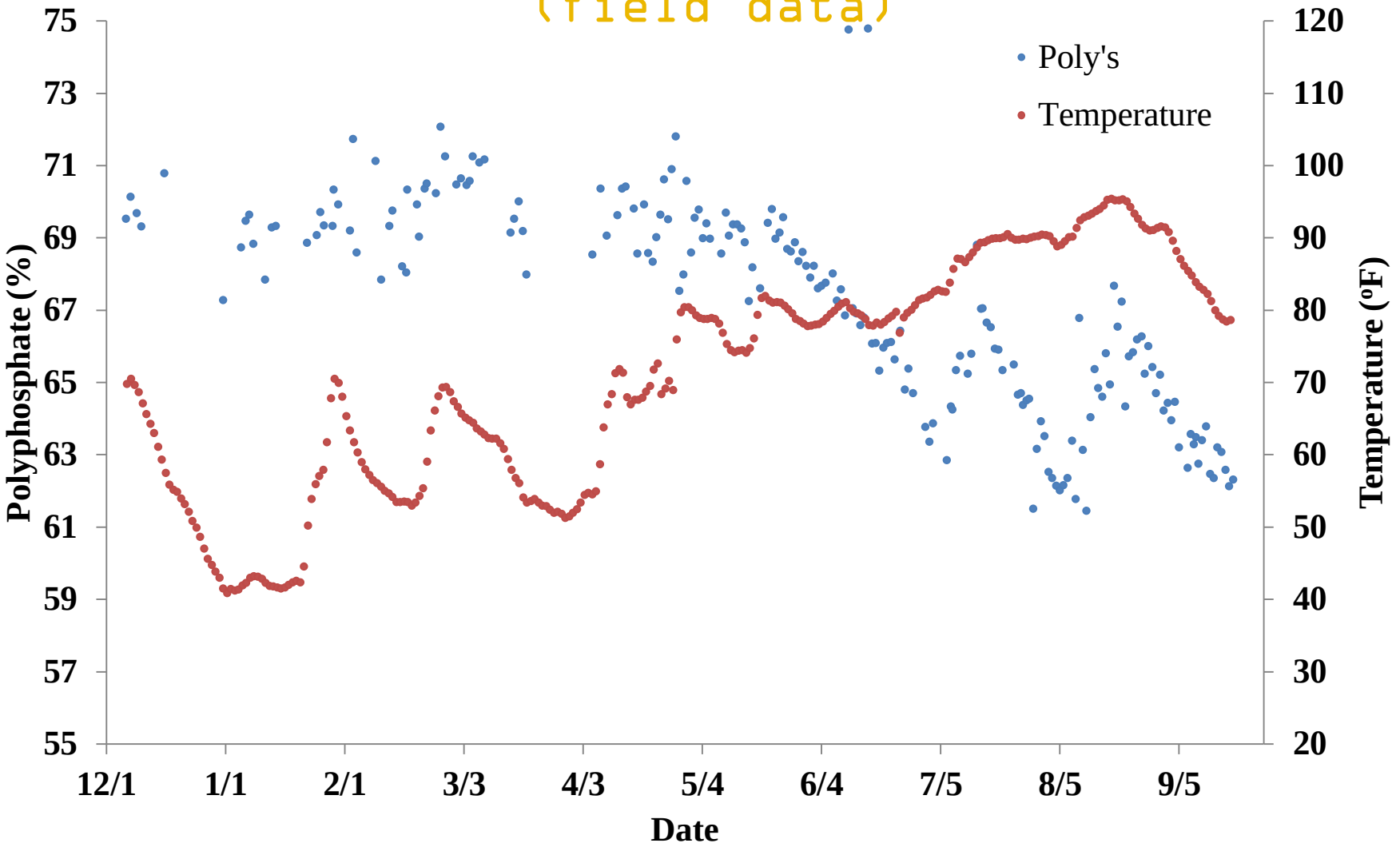
11-37-0 Product Solids Formation in Storage

(in a lab controlled environment)

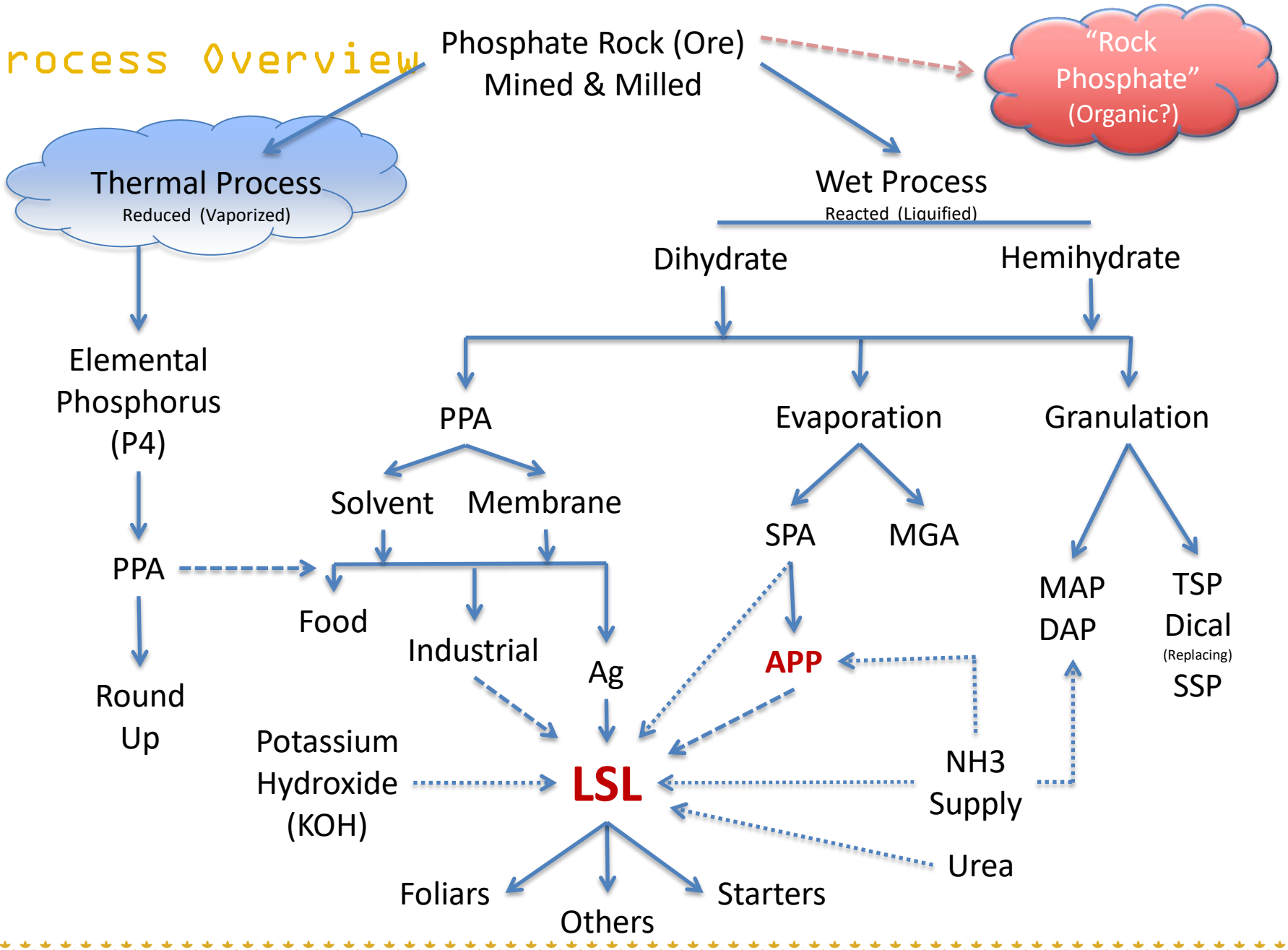


Storage Temperature & Polyphosphate

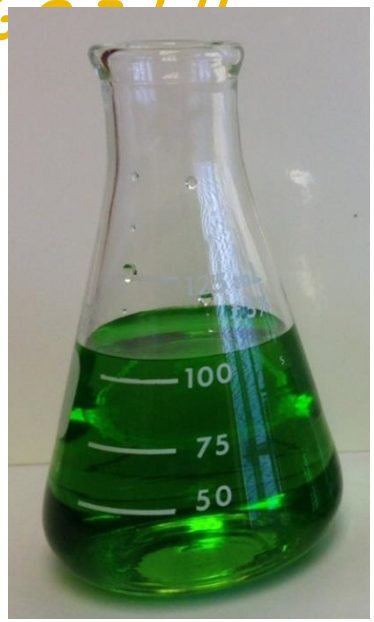
(field data)



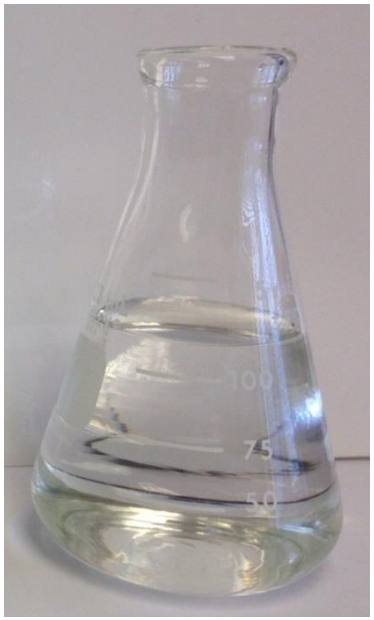
Process Overview



High Quality Low Salt Liquid (LSL) NPK's: *"The Goal"*



Mid Poly
6-24-6



3-18-18

- Seed Safe
- Foliar Applicable
- 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

Technical Review!
Salt Index & Calculations

- **SI** – Relation of the extent a fertilizer increases the osmotic pressure of a soil compared to Sodium Nitrate ($NaNO_3$).
  - Greater the SI value, the greater potential 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
10-34-0	20
11-37-0	22
11-52-0	27
Ammonia	47
UAN 32	71
Urea	74

High Quality NPK: Physical Properties

	3-18-18	4-16-16	LP 6-24-6	MP 6-24-6
pH	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 (lbs/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: *"Water White LSL"*

Base chemical reactions:

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

PPA	Potassium Hydroxide	Mono Potassium Phosphate	Di Potassium Phosphate	Water	Heat

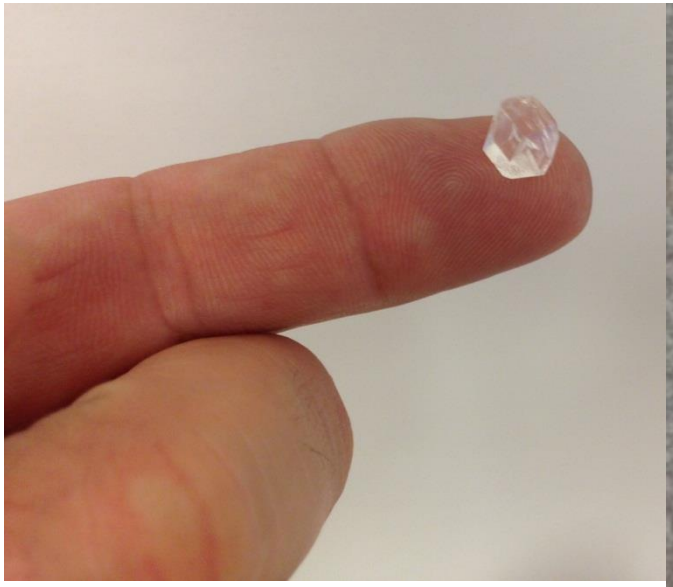
2) $NH_3 + KH_2PO_4 \rightarrow KNH_4HPO_4 + Heat$

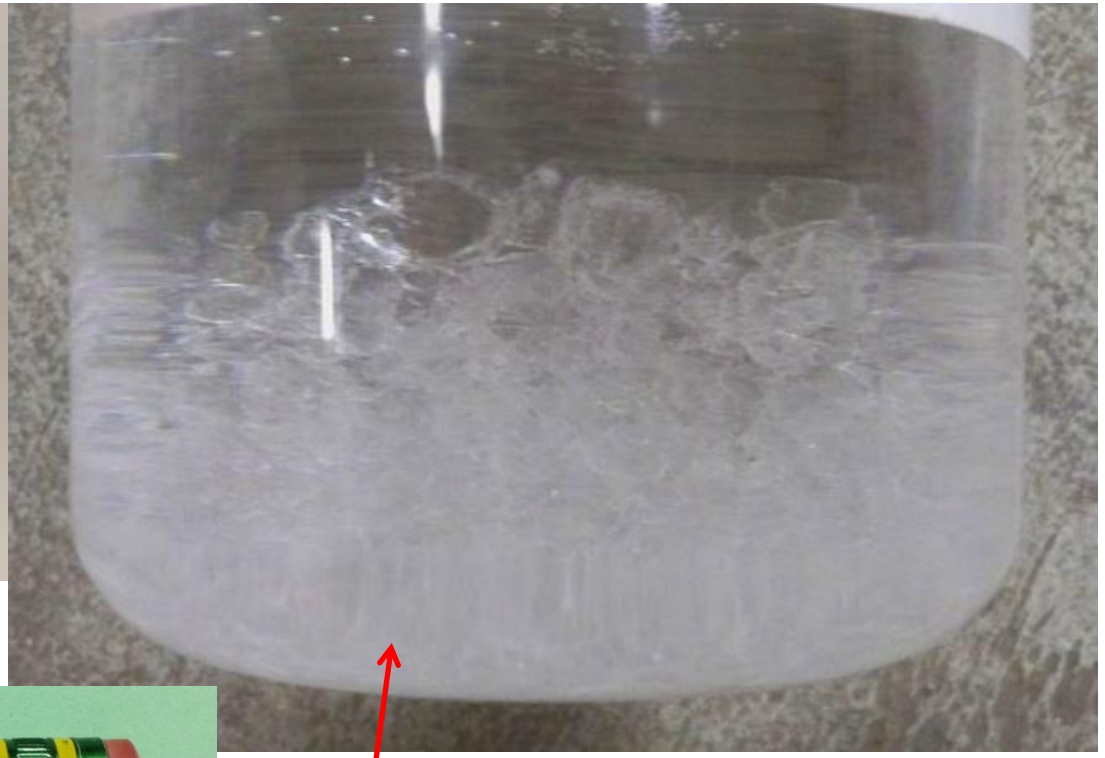
Ammonia	Mono Potassium Phosphate	Di Basic Potassium Ammonium Phosphate	Heat

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)





Salting (Mono Potassium Phosphate Crystals)

Over Ammoniation

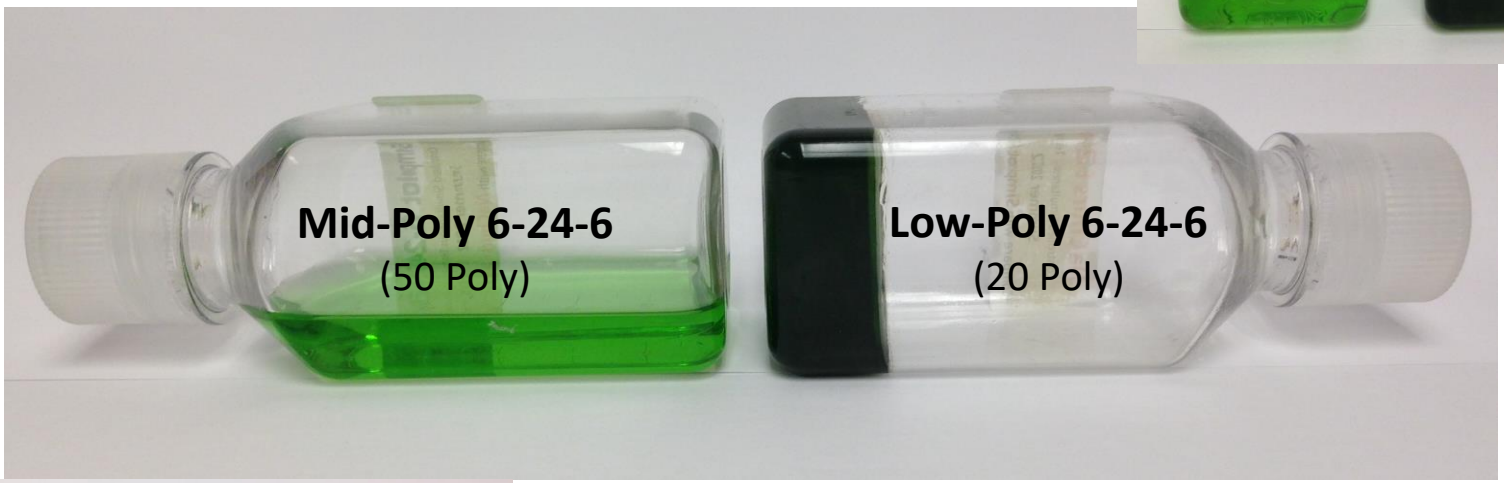
Ammonia Sparger: Salting - Ammonium Phosphate Crystals

Keeping the System Clean

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

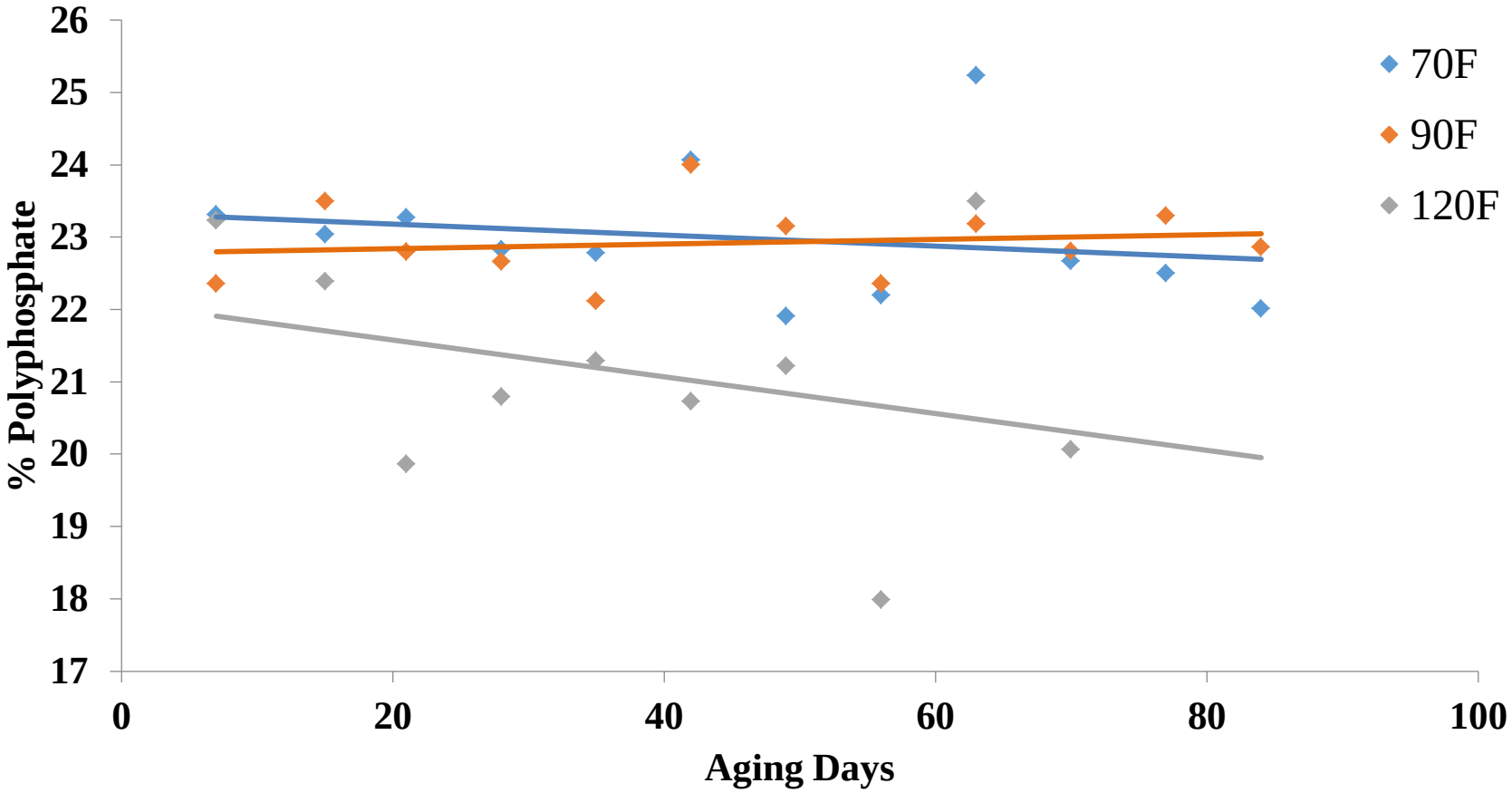
Correlation: Low Polys & S

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.

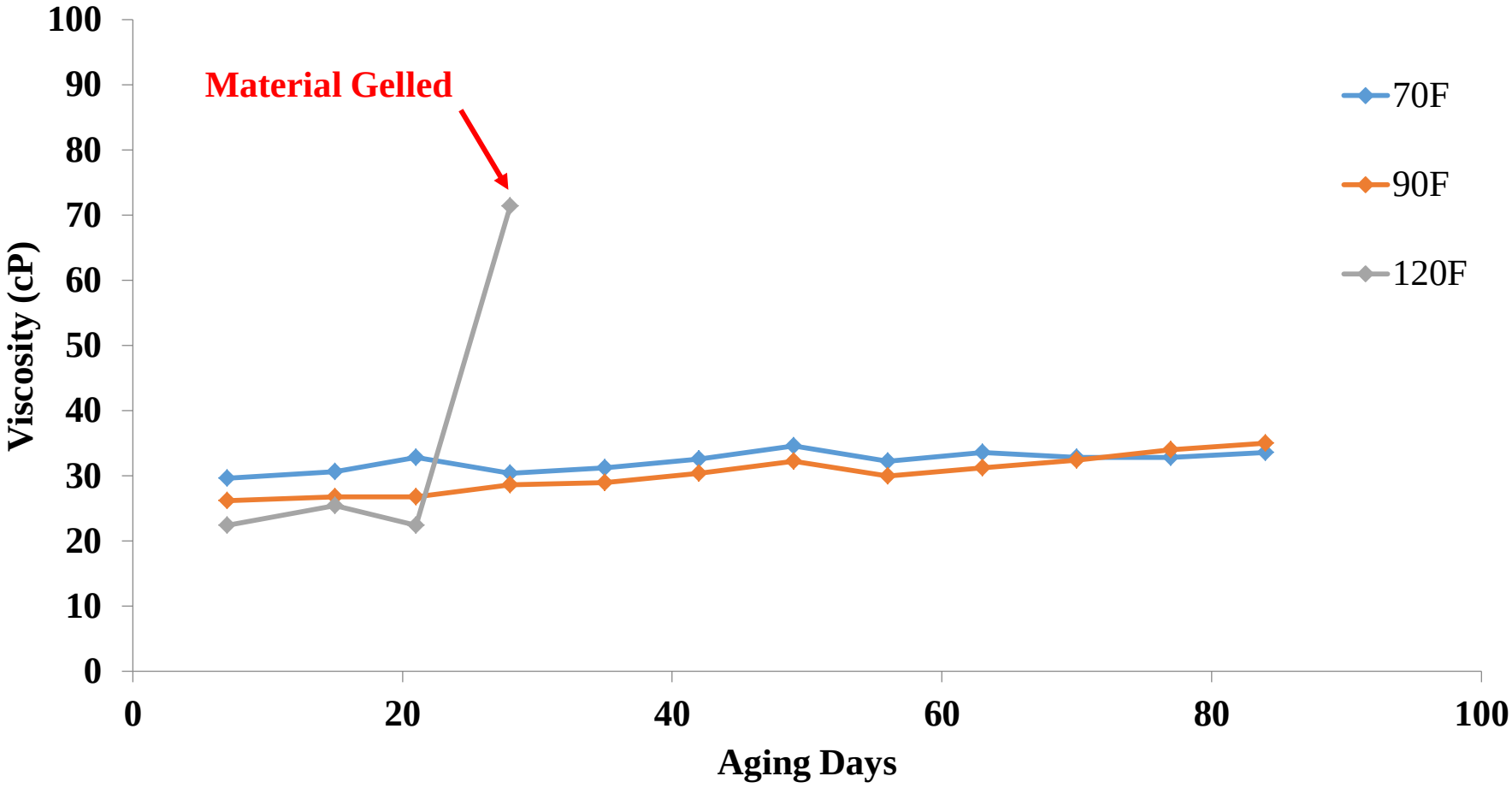


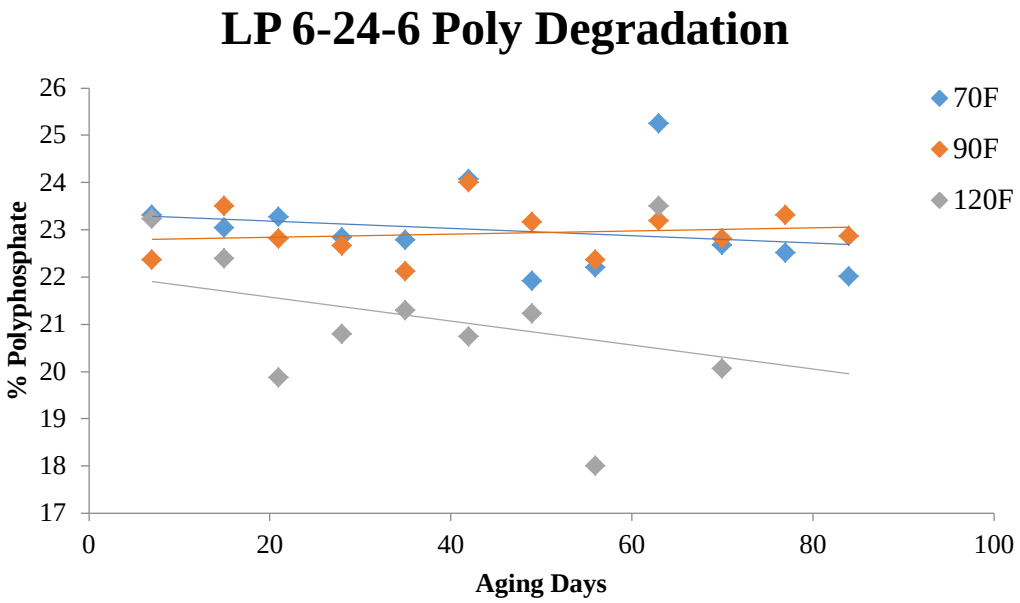
Even with aggressive agitation, once this material jells, it will not return to a full fluid state.

Low Poly 6-24-6 Degradation



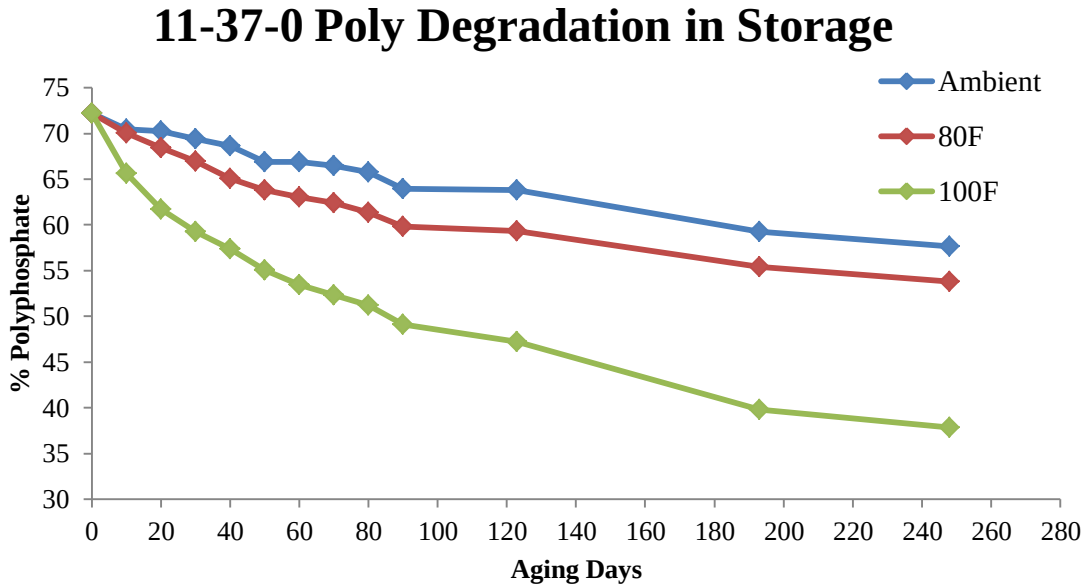
Low Poly 6-24-6 Viscosity





What's the Data Telling Us?

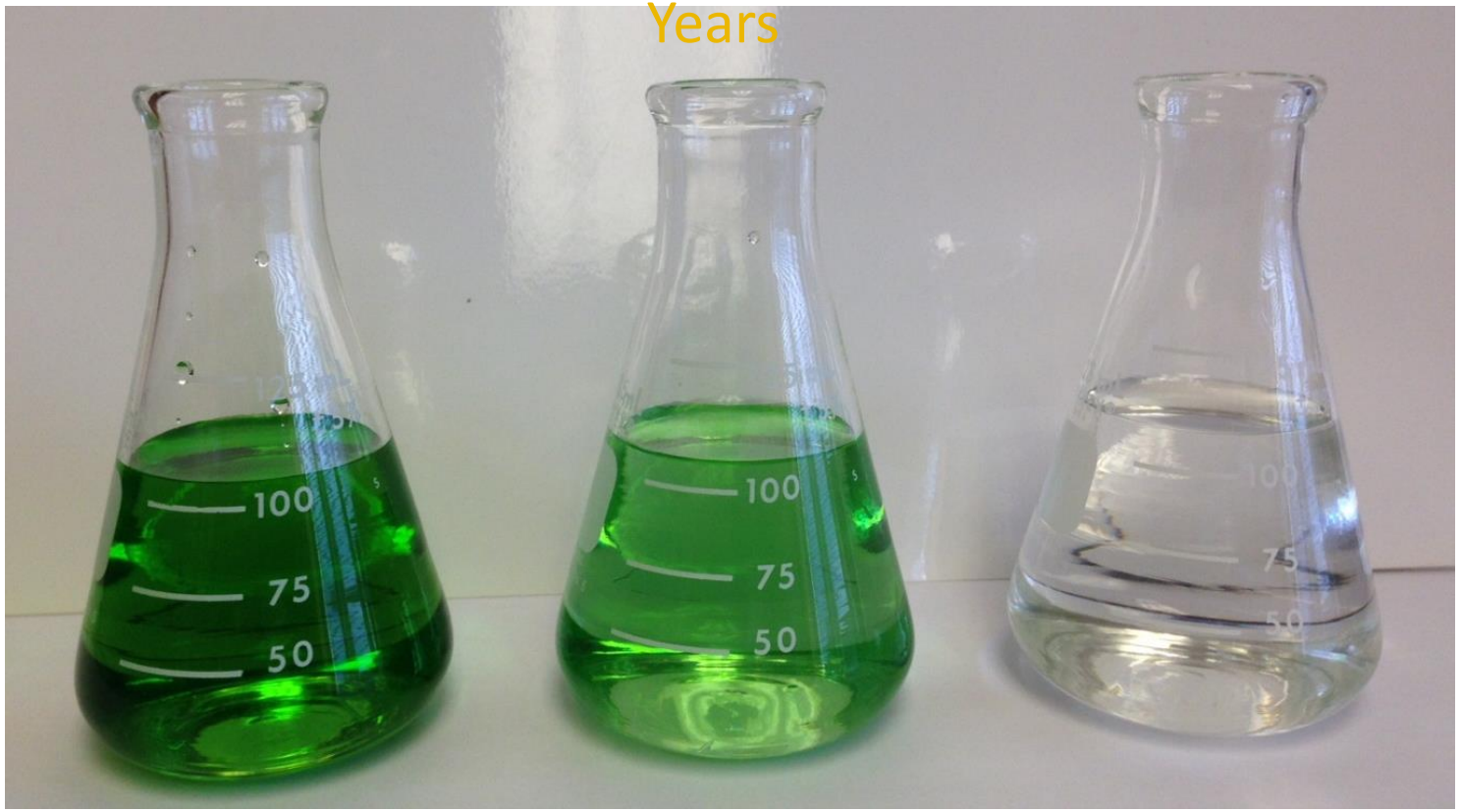
There are similar and yet different conditions that should not be overlooked!



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 **3-18-18**

Bottom **Top**

Questions

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