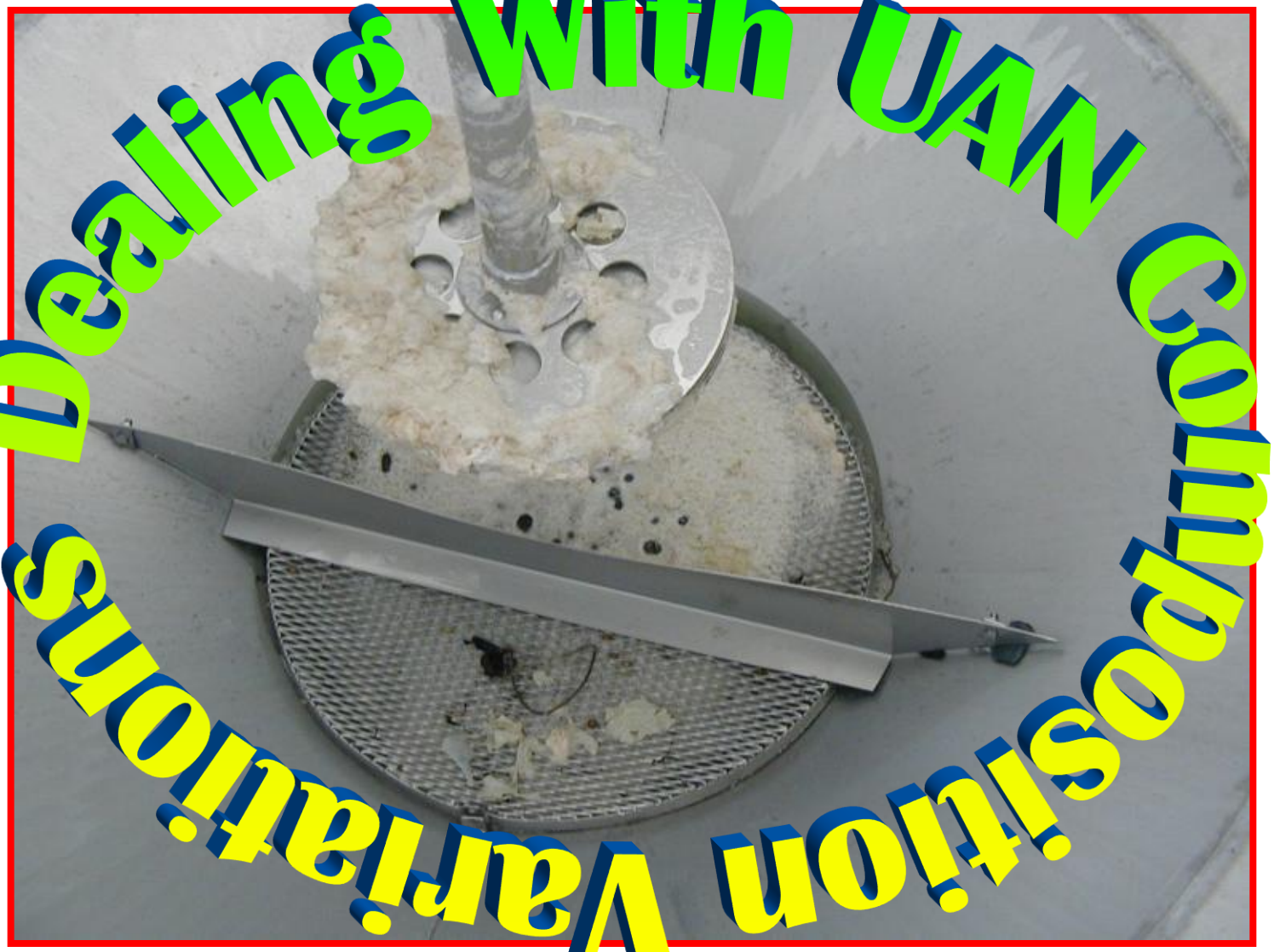
Dealing With UAN Composition Variations



J. May Equipment/ ATA, Inc. Arlington, TX

Fluid Fertilizer Foundation

Columbus, OH Dec. 5 & 6, 2017

Physical & Chemical Characteristics of Urea-Ammonium Nitrate Solution UAN

GRADE , % N	28-0-0	30-0-0	32-0-0
Composition, % by Weight			
Ammonium Nitrate	40.1	42.2	44.3
Urea	30.0	32.7	35.4
Water	29.9	25.1	20.3
Specific Gravity @ 16°C / 61° F	1.283	1.303	1.32
Weight Per Gallon	10.7	10.86	11.06

UREA, Slow Release

Must Be Decomposed By Microorganisms To Be Assimilated By The Plant

AMMONIUM NITRATE

Fast Release

Plants Quickly Absorb The Nitrate Ion Ammonium Ion for Immediate Metabolism

UAN Solution

- **Safe To Use**
- **Easy To Apply, EVEN !!!**
- **Uniform Application with Herbicides**
- **Easy To Inject In Irrigation**

- **Alternate To NH_3**
- **Compare To Dry Spread Pattern,**

  No Comparison

CORROSION INHIBITORS

- UAN Solution always contains a small amount of Corrosion Inhibitor
- Helps Protect Carbon Steel Tanks
- 10-34-0, P_2O_5 reacts with the Iron and forms a coating inside the tank

CORROSION INHIBITORS

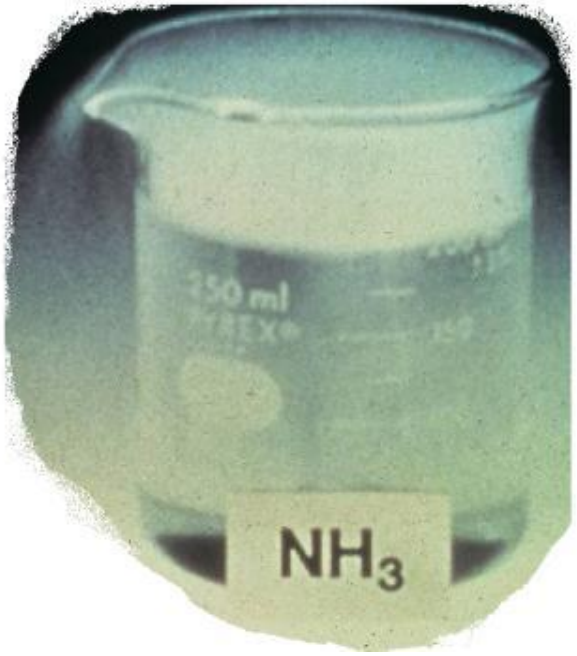
Anhydrous Ammonia

Used as a Corrosion Inhibitor

Used to Adjust pH to 7.0

"THE CULPRIT"

FREE AMMONIA



VARIOUS PROBLEMS IN VARIOUS PLACES

- Suppliers, wide variations in composition, not analysis
- If it Smells Like Strong Ammonia, it could be a problem
- What you combine it with makes a difference
- Mixing Sequence can reduce the problems

REACTION NOT THE ONLY PROBLEM

- High Free Ammonia Causes Severe Burn

To Crops, Wheat, Rye Grass……

Stop the Burn……. Sweeten It UP !!!!!

Add 1 pound of Sugar Per Ton

This Reduces The Burn To Almost Undetectable

No Reason To Change To Dry Application

60 Units of Nitrogen With No Burn

SUSPENSIONS FROM MAP BASE GRADES

- 10-30-0 IS A 1 TO 3 AMMONIA NITROGEN TO P_2O_5 RATIO
- HIGH FREE AMMONIA CONTENT IN UAN REACTS WITH THE PHOSPHATE
- 1 TO 3 CREATES THE BEST PROPERTIES FOR 10-30-0
- 6.5 Ph, Slightly on the DAP side of the Eutectic point, small DAP crystals

“FRIED” 10-30-0

- The Ammonia in the UAN reacts with the Phosphate… Over ammoniating the phosphate….. Not 1 to 3 Ratio
- Some reactions can be sizzling….
- The 10-30-0 is “fried” to create crystals
- Larger DAP, cubical crystals, are produced
- Plugs Strainers and Nozzles
- Viscosity Can Increase
- pH is increased, the solution is less soluble

MAIN PROBLEM, CRYSTALS

- DAP crystals are cubical
- MAP crystals are long and needle like
- DAP is desirable… Small DAP that is…
- Over Ammoniation creates LARGE DAP crystals
- These plug strainers and nozzles
- Plugging causes a “Log Jam” and strains out other items such as clay
- Reduced clay content in the load causes settling

FIX IT BEFORE IT LEAVES

- Mechanical Fixes:
- Pump Recirculation
- Agitation
- Pump Through The Eductor
- Resident Time In The Pump, Impeller Grinds Them Up
- Go Fast to Application.. Do Not Store
- Crystals re-form in the storage tank

10-34-0 REACTION

- Makes Finished Product Blends Cloudy
- Can reduce the Poly content
- 10-34-0 Rule 101:

  Never add ammonia to 10-34-0
- If Phosphoric Acid is available use a small amount in the blend to give the Ammonia something to do….
- Sequence is important.
- Water…. Acid…. UAN…. 10-34-0…. The rest

UAN NOT ALWAYS THE CULPRIT

- Clear blends of UAN, 10-34-0, 12-0-0-26 have been known to have viscosity problems in hot weather
- The free ammonia causes the cloudy appearance, not the viscosity change
- Heat will drive off water.. Increasing Plant Food Content… Raising Viscosity
- Add a bucket of water and stir, back to new

UAN PROBLEMS

- Usually a little common sense will fix the problem
- Look for Transportation Contamination
- Demand Cleaning of Tankers Before Loading
- Sample Railcars For Contamination
- Make your mixing equipment work at the maximum capability
- Call when the “Fit Hits the Shan“….

UAN “NEVER”

NEVER !!! Mix With Calcium Nitrate CAN-17

or

Solutions Made With Calcium Nitrate

Creates a Milky White

Insoluble Precipitant

PLUGS EVERYTHING !!!

ALTERNATES TO UAN

- Reducing the use of UAN in the formula can reduce the reactions.
- Other EASY to Use Nitrogen Sources, UREA, Ammonium Sulfate…..

AMMONIUM SULFATE

- Ammonium Sulfate can be reduced to

  8.7-0-0-10 S Liquid. Added as a liquid, final blend temperature not effected

  Use the water as “Blend Water”

  Sell The Balance of Sulfur to Nitrogen in the blend,

  1 part S to 12 parts N..

  S Increases Protein, Total Digestible Nutrients,

  Activates Legumes, Soybeans

  Greens up grass quick

UREA

- Add as a dry to finished product blends
- Caution: Cold … Cold … Cold….
- Urea is 110 Negative BTU per Pound
- About 1° F per 15 Pounds (per ton), 150 Pounds = 10 degrees drop from ambient water temp.
- Add early in sequence.. Urea is light and will float if proper agitation and recirculation is not available. Adding early, into water, it sinks and has more time to dissolve.

UREA RULE OF THUMB

- In high Nitrogen Formula 50% of the supplemental "N" can be from Urea. The balance UAN
- ***Example: 10-3-18 Suspension***
- Water 715
- *Urea* *196*
- Clay (Dry) 27
- *UAN* *281*
- 0-0-62 581
- 10-30-0 200
- Total 2000

281 Pounds of 32-0-0 Not 562 pounds

UREA RULE OF THUMB

- In high Nitrogen Formula 50% of the supplemental "N" can be from Urea. The balance UAN
- ***Example: 10-3-8 Clear Liquid***
- Water 1083
- Urea 198
- 0-0-62 258
- 10-34-0 176
- 32-0-0 285
- Total 2000

285 Pounds Of 32-0-0 Not 570 Pounds

USING UREA

- It may reduce costs
- Reduces the Free Ammonia reactions of 32-0-0
- May help in sequestering micronutrients in a blend… 40 pounds per ton will keep Iron, Manganese, Magnesium, Zinc and other metals from falling out or causing viscosity problems

UREA SOLUTION PRODUCTION

UREA – WATER SOLUTIONS							
GRADE	% UREA	Ton Formula Urea *	Water	Specific Gravity	LBS/GALS	SALT OUT TEMP	MINIMUM HOT WATER TEMP.
14-0-0	30.43	610	1390	1.087	9.06	10°F	58°F
15-0-0	32.60	652	1348	1.092	9.10	14°F	67°F
16-0-0	34.78	696	1304	1.098	9.15	18°F	76°F
17-0-0	36.96	740	1260	1.105	9.20	23°F	88°F
18-0-0	39.13	783	1217	1.110	9.25	28°F	99°F
19-0-0	41.30	826	1174	1.117	9.31	33°F	110°F
20-0-0	43.47	870	1130	1.123	9.36	39°F	124°F
21-0-0	45.46	910	1090	1.129	9.41	45°F	137°F
22-0-0	47.82	957	1043	1.136	9.47	52°F	153°F
23-0-0	50.00	1000	1000	1.147	9.57	57°F	167°F

BTU REQUIRED

22-0-0 Urea Solution

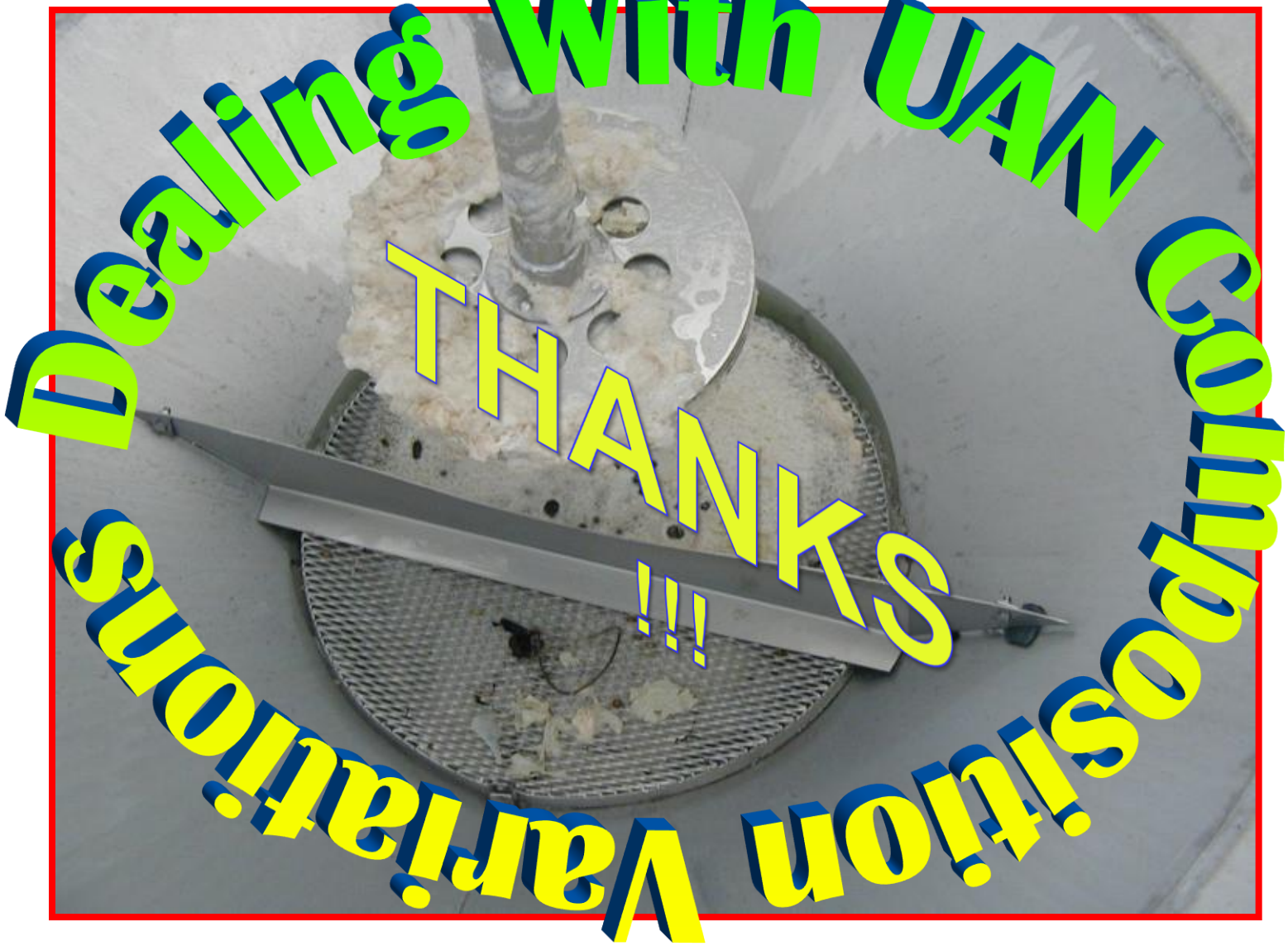
		N	P	K
	ANALYSIS	22	0	0
MATERIAL	POUNDS	440	0	0
Water	1043			
Urea	957	440		
Total	2,000	440	0	0

Heat to dissolve the Urea: Example calculation

957 Pounds X -110 BTU / Pound Urea = 105,270 BTU / Ton

105,270 BTU ÷ (1043 Pounds Water x 1 BTU/F°) = 101° the water will cool. 101° + cold water temp (or S.O.T.) = Temperature of water to mixer. 101° + 52° = 153° F. Water at 153° F should be adequate for total dissolution of the Urea.

Call anytime, 800-286-8485
Always Glad To Help



J. May Equipment/ ATA, Inc. Arlington, TX

Fluid Fertilizer Foundation

Louisville, KY Dec. 8-9, 2015