



FORMOLENE: SHORT CHAIN UF PROVIDES STABLE SOLUTION

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Nitrogen fertilizers have been around for a long time. **Solution** fertilizers have been around for a long time. But until recently, these solution fertilizers were really suspensions, not true solutions. Formalene™ is a true solution, controlled-release nitrogen fertilizer manufactured by Ashland Chemical Company.

Formalene™ is contained in a water solution of "short-chain" urea formaldehyde compounds, principally methylol-urea along with urea.

During the manufacturing process for producing these and other urea-formaldehyde products a large quantity of urea containing a high percentage of nitrogen is reacted with a small quantity of formaldehyde at moderately high temperatures in the presence of catalysts for a precise time period. This reaction causes the formation of a number of urea formaldehyde compounds which, as "short chain" methylol ureas, methylene diureas, and dimethylol ureas, will remain in water solution when kept alkaline at around 9 to 10 pH.

Some manufacturers elect to continue the polymerization process converting these soluble "short chain" compounds into "longer chain" urea formaldehyde water insoluble polymers which are subsequently chipped or powdered and bagged for distribution to the marketplace.

Whereas, "short chain" water soluble UF materials, methylol ureas, are shipped as bulk or drummed liquid concentrates. This concentrate contains only 15 percent water, has a nitrogen concentration of 30 percent, and does not salt out until the temperature drops below minus 20 degrees F.

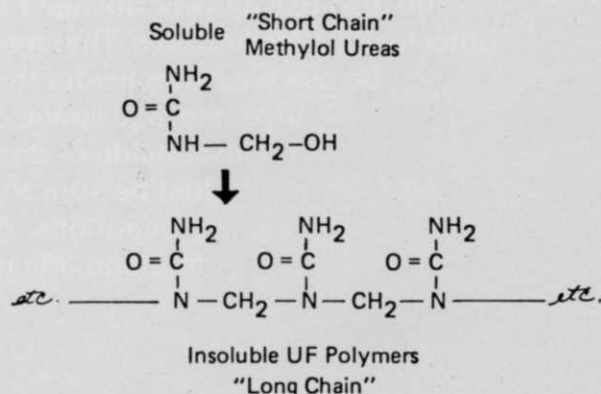
A straight urea solution contains 57 percent water, 43 percent urea, 20 percent nitrogen, and salts out below 30 degrees F. This relatively high saltout temperature requires storage tanks to be heated or insulated to prevent saltout. This generally not necessary for Formalene™.

Also, urea solutions are a neutral pH while Formalene™ is kept usually around a pH of 9 or 10 for it to remain as a stable water solution.

Formalene™ is both a foliar and root feeding liquid nitrogen. While it is possible to burn grass with "short chain" methylol ureas, their nitrogen phytotoxicity potential is significantly lower than with urea solutions; and when they are applied at rates of one to two pounds of nitrogen per 1,000 square feet, burn has not been a factor when used with normal water dilutions.

The moderate initial response of Formalene™ reduces the tendency for disease problems associated with the excessive burst of growth frequently experienced with urea applications particularly in the spring. The nitrogen release period is around 8-12 weeks. Also, it appears that there is a higher

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degree of nitrogen utilization according to our first commercial year experience. If proven, this would permit a reduction in total applied nitrogen to still get the desired results. A reduction from 4 lb. per year per 1,000 square feet to 3 lb. may be possible.

Some quantity of Formalene™ must be stored at your shop. But, the task of handling many bags of dry material is eliminated. A liquid storage facility is required.

The most important advantages of a liquid fill system over a system using dry material from bags include: reduced labor, reduced mixing and loading time; and increased accuracy with liquid metering.

Formalene™ holds promise for fertigation applications and as an additive to organic manure mixtures.

WTT

**Formolene™ Fertilizer
Comparative Performance Properties
(After Application)**

Property	Formolene Solution	UF Powder Suspension	Urea Solution
Burn Potential	Low	None	Med-Hi
Initial Response	Moderate	None-Low	High
N-Release Period*	8-12 Weeks	2-3 Years	4-8 Weeks
N-Utilization* (by the plant)	85-95%	70-80%	50-85%

*Estimates pending verification in continuing university and field tests.