



Winter Guidelines for UAN Solutions (28-0-0 and 32-0-0)

Storage Guidelines for UAN solutions (28-0-0 and 32-0-0)

Storage of 28-0-0 UAN solution is the preferred solution to over winter. Due to the higher salt out temperature, 32-0-0 may crystallize a significant amount of urea and /or nitrate in the bottom of the tanks.

28-0-0 Salt out temp = -18°C (0°F)

32-0-0 Salt out temp = 0°C (32°F)

When the temperature drops below -18°C , some “salt out” of urea and/or nitrate can occur. When the temperature rises above -10°C , recirculation of the tank is required to re-dissolve the crystallized product in 28-0-0 solution.

Suggestions for storing solution over the winter:

- 1) Store 28-0-0 UAN solution.
- 2) Do not store a full tank of solution. Allow room to add a truckload of hot UAN solution in the spring.
- 3) Pump recirculation system that is able to re-circulate from either top to bottom and bottom to top.

Re-dissolving Crystallized UAN solutions (28-0-0 UAN)

In situations where UAN solution has resulted in “salt out” occurring due to cold temperatures, it is possible to re-dissolve the crystals back into solution once the outside temperature has gone significantly above the “salt out” temperature.

The situation is similar to putting salt in water. If you add a given amount of salt into a glass of water, in theory all of the salt should dissolve into solution. The problem that arises is that without mixing you do not have the “ideal” solution. The salt does not dissolve completely and you may end up with a layer of solution just above the salt which is saturated with dissolved salt, but above that the solution may not be saturated. The only way to dissolve all of the salt is through good mixing. The same goes for UAN solution.

Suggestions for Re-dissolving precipitated UAN solutions (28-0-0)

- 1) Outside temperature should be above -10°C (minimum). The higher the better.
- 2) Circulation ideally should be done by pumping solution from the top of the tank back into a bottom nozzle. The top solution will be weaker and has the greatest ability to re-dissolve the bottom crystals. Any method to turn the solution over will aid in re-dissolving of the crystals.
- 3) Circulation to re-dissolve could take anywhere from 24 to 72 hours of circulation and depends on:
 - a. Size of tank
 - b. Circulation rate (*Should be able to turn over tank 4-6 times in 24 hour period*)
 - c. Outside temperature
- 4) If salting out is still present after 72 hours, change circulation points or reverse direction (*ie. Pump from bottom of tank to top*).

Other Options to aid re-dissolving

1) Tank design

- a. **Hopper bottom** - There are positives and negatives to this design. The negatives are with the cone shape - heat loss will be greater in the winter leading to salt out in the cone. It might be helpful to insulate the bottom cone to minimize this problem. The positive aspect is with a bottom hopper and nozzle. You may be able to re-dissolve the crystallized product in the cone easier if establish circulation by pumping from the top through the bottom cone. The risk is that the bottom cone may be plugged solid.
- b. **Flat bottom** - The heat loss will be less than a hopper bottom tank and this is an advantage if the winter temperature is slightly below the salt out temperature. This may result in less salting out. For prolonged cold temperatures - the design of the tank probably does not matter. The disadvantage is on recirculation. The flat bottom tank does not promote even recirculation which may result in areas that do not re-dissolve. In this tank, it is important to have two or three bottom nozzles in different locations that you can re-circulate.

2) Exterior tank colour

The darker the color the quicker the solution will heat up due to solar heating in the spring. There is no firm evidence that a dark coloured tank will corrode more rapidly but regardless of exterior colour, the interior should be coated with a special coating to resist corrosion. Agrium can recommend the preferred coating used on the inside for corrosion resistance on steel tanks. We also recommend you inspect the interior of your tanks once every 3 years to check for corrosion (*steel tanks*).

3) Add solution

If room exists in the tank, add a hot load of UAN solution and re-circulate as indicated above.

Other Issues

Empty tank with UAN crystallized in the bottom of the tank.

1) Adding new solution on top of crystals:

- a. May not re-dissolve all of crystallized product
- b. Changes the nitrogen concentration of the solution you added
- c. Definitely not recommended to put new solution on top of crystallized product prior to going into winter season

2) Re-dissolve with water or diluted UAN solution (25% UAN solution)

Handling Precautions

With salt out, the product could be predominantly ammonium nitrate. If you are planning to store product over winter, do not let any oils, gas, greases come in contact with the solution. There have been stories of customers using gear oil to color the UAN solution; this could be a dangerous situation if ammonium nitrate happened to crystallize out of the UAN solution. The result could be an explosive mixture.

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