

## Fluid Fertilizer Density

Below are some typical values for physical characteristics of some common fluid fertilizers. Keep in mind that these values will vary depending on the raw materials used, impurities in the product, handling techniques, etc. These are ballpark values only-they should be checked on your individual materials.

| Product               | Typical *              |                   |                  |         |
|-----------------------|------------------------|-------------------|------------------|---------|
|                       | Salt-out<br>Temp. (°F) | Density<br>lb/gal | Percent<br>Water | pH      |
| 28-0-0                | -1                     | 10.6              | 30               | 7.2 **  |
| 32-0-0                | 28                     | 11.06             | 20               | 7.2 **  |
| 20-0-0 (urea)         | >32                    | 11.08             | 57               | --      |
| 20-0-0 (amm. nitrate) | >32                    | 10.55             | 41               | --      |
| 6-24-6                | 10                     | 11.2              | --               | 6.4     |
| 9-18-9                | <20                    | 11.1              | --               | 7.2     |
| 3-18-18               | --                     | 11.76             | --               | 7.6     |
| 10-34-0               | -10                    | 11.65             | 37               | 6.0     |
| 11-37-0               | <32                    | 11.9              | 32               | 6.0     |
| 12-0-0-26S (ATS)      | 20-44                  | 11.1              | 40               | 7.4     |
| 0-0-25-17S (KTS)      | <15                    | 12.2              | --               | 7.0-8.2 |
| 0-0-0-10S-4Mg (MgTS)  | <15                    | 10.3              | --               | 6.5-7.5 |
| 0-0-0-10S-6Ca (CaTS)  | 32                     | 10.43             | --               | 7.0-8.0 |
| 6-0-16.5Cl (Amchlor)  | --                     | 9.05              | 75               | 6.5-8.5 |
| 7Mg-27Cl (Chlori-Mag) | --                     | 10.8              | --               | --      |
| 10-0-0-10Zn           | 32                     | 10.4              | 63               | 10.5    |
| 7-21-7                | 20                     | 11.2              | 48               | 6.5     |
| 4-10-10               | 18                     | 10.3              | 63               | 6.5     |
| 8-21-4-3S-.5Zn        | <5                     | 11.3              | 46               | 6.5     |
| 9-18-4-6S-.5Zn        | <5                     | 11.3              | 43               | 6.5     |
| 9-20-2-7S-.5Zn        | <5                     | 11.4              | 42               | 6.5     |
| 18-13-0-7S            | <5                     | 11.3              | 32               | 6.1     |
| 10-30-0-3S            | <5                     | 11.7              | 37               | 6.1     |
| 28-0-0-5S             | 10                     | 10.76             | --               | >7.2**  |

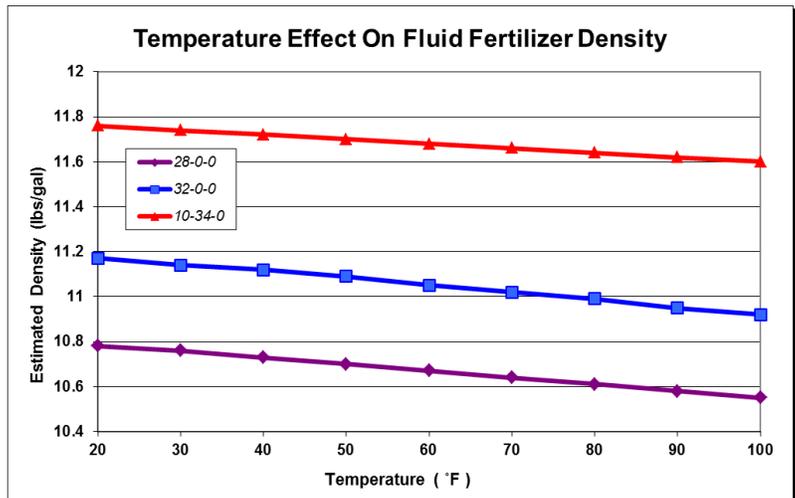
\* Actual values vary. Above information is a guide only.

\*\* pH of UAN may vary depending on corrosion inhibitor and free ammonia content

## Temperature Effect On Density

While temperature has a small effect on the density of liquid fertilizers, the effect is relatively minor and generally is not of practical importance. However, temperature can aggravate shrink problems if the product temperature is not taken into account when taking inventory on large storage tanks.

For example, suppose that 80 degree 28-0-0 is placed in storage (density of about 10.6 lb/gal). If the product were allowed to cool to 40 degrees and inventory were taken, there would be an apparent shrink (1.3%) if it is assumed that the product still weighed 10.6 lb/gal - instead of a more correct 10.74 lb/gallon. The graph below provides an estimate of the effect of temperature on the densities of 28-0-0, 32-0-0 and 10-34-0.



### Estimated Density Of Fluid Products

| Product     | 28-0-0 | 32-0-0   | 10-34-0 |
|-------------|--------|----------|---------|
| Temperature | - - -  | lb / gal | - - -   |
| 20          | 10.78  | 11.17    | 11.76   |
| 30          | 10.76  | 11.14    | 11.74   |
| 40          | 10.73  | 11.12    | 11.72   |
| 50          | 10.7   | 11.09    | 11.7    |
| 60          | 10.67  | 11.05    | 11.68   |
| 70          | 10.64  | 11.02    | 11.66   |
| 80          | 10.61  | 10.99    | 11.64   |
| 90          | 10.58  | 10.95    | 11.62   |
| 100         | 10.55  | 10.92    | 11.6    |

## Measuring Density of Liquid Fertilizer

The actual density of products should be measured and you should not simply use standard 'table values'. A simple method is to fill any container with water and weigh it - taking into account weight of container. Then repeat with the liquid fertilizer and compare its weight to the weight of the water. By comparing these weights you can determine the specific gravity and hence the density of the liquid.

$$\text{Specific Gravity of Fertilizer} = \frac{\text{Weight of fertilizer}}{\text{Weight of water}}$$

$$\text{Density of Fertilizer (lb/gal)} = \text{Specific Gravity of fertilizer} \times 8.34$$

For example – assume a 5 gallon pail of water weighed 42.7 pounds after subtracting out the weight of the pail. When filled with 28% UAN, the weight of the fertilizer was 53.4 pounds.

$$\text{Specific Gravity of UAN} = 53.4 / 42.7 = 1.28$$

$$\text{Density of UAN} = 1.28 \times 8.34 = 10.67 \text{ lb/gal}$$

Dale F. Leikam