UAN fertilizers are inorganic substances, multi-constituent, an ammonium nitrate and urea mixture. It contains as impurities biuret and additives.

1. Identification and classification
Name: ammonium nitrate and urea mixture
Chemical formula: \( \text{NH}_4\text{NO}_3, \text{NH}_2\text{-CO-NH}_2 \)
ECHA registration number for ammonium nitrate: 01-211940981-27-0064
EC number: 229-347-8
CAS number: 6484-52-2
ECHA registration number for urea: 01-2119463277-33-0059
CAS number: 57-13-6
EC number: 200-315-5
UAN type fertilizers are not classified as dangerous mixtures according to (EC) Regulation no. 1272/2008.

2. Technical quality conditions

<table>
<thead>
<tr>
<th>No.</th>
<th>Characteristics</th>
<th>Standard/Testing methods</th>
<th>Technical requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aspect</td>
<td>Visually</td>
<td>colourless liquid to yellow</td>
</tr>
<tr>
<td>2.</td>
<td>( N_{\text{total}} )</td>
<td>Calculation</td>
<td>32%</td>
</tr>
<tr>
<td>3.</td>
<td>( N_{\text{ammoniacal}} )</td>
<td>Calculation</td>
<td>7.75%</td>
</tr>
<tr>
<td>4.</td>
<td>( N_{\text{nitrile}} )</td>
<td>Calculation</td>
<td>7.75%</td>
</tr>
<tr>
<td>5.</td>
<td>( N_{\text{nitrile}} )</td>
<td>SR ISO 5661:1995</td>
<td>15.5 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISO 758:1976</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SR EN ISO 12185:2002</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>( N_{\text{amidic}} )</td>
<td>SR ISO 5661:1995</td>
<td>16.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISO 758:1976</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SR EN ISO 12185:2002</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Ratio between % of urea and % of ammonium nitrate in UAN</td>
<td>calculation</td>
<td>min.0.74 max 0,80</td>
</tr>
<tr>
<td>8.</td>
<td>Alkalinity</td>
<td>SR ISO 1593:1999</td>
<td>max.0.1% NH(<em>3)</em></td>
</tr>
<tr>
<td>9.</td>
<td>( pH )</td>
<td>STAS 8619/3-90</td>
<td>7.5±0.5 units</td>
</tr>
<tr>
<td>10.</td>
<td>Biuret</td>
<td>SR ISO 1593:1999</td>
<td>max.0.5%</td>
</tr>
<tr>
<td>11.</td>
<td>Corrosion inhibitor</td>
<td>Nalco method</td>
<td>min. 100 ppm</td>
</tr>
<tr>
<td>12.</td>
<td>Density at ( t=15^\circ C )</td>
<td>SR EN ISO 12185:2002</td>
<td>min.1.320 g/cm(^3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISO 758: 1976</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Crystallization point</td>
<td>STAS 8671-78</td>
<td>0(^\circ)C</td>
</tr>
</tbody>
</table>

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Note: at the client’s request additional tests may be performed, or other requirements may be established. The test results in sections 3, 4, 8, 10, 12, 13 are guaranteed by the producer and the determinations are done at request.

3. Testing methods

- Aspect: visually
- Nitrogen content in ammonium nitrate and urea is determined through the physical analysis method, using Sluiskil method: the density of the UAN solution at a temperature of 15.0°C is determined in vacuum according to SR EN ISO 12185:2002 or ISO 758:1976. The index of refraction is determined at a temperature of 20°C according to SR ISO 5661:1995. Using the charts accompanying the Sluiskil method, it is determined the nitrogen content in ammonium nitrate and the nitrogen content in urea and the content ammonium nitrate and urea.

The chemical analysis method is used to confirm the results, as follows:

- Total nitrogen content, according to EC Regulation no. 2003/2003 method 2.6.2. In the presence of nitrates, the solution is first reduced using Ulsch method (when nitric nitrogen is transformed into ammoniacal nitrogen through reduction of Fe and and concentrated sulphuric acid), using Kjeldahl digestion with sulphuric acid and catalyst, amidic nitrogen is transformed into ammoniacal nitrogen. Ammoniacal nitrogen is determined according to SR EN 15475:2009.
  - Ammoniacal nitrogen content, according to SR ISO 7408:1993, SR EN 15604:2009 or EC Regulation no. 2003/2003, method 2.6.2. Ammoniacal nitrogen, as ammonia, is freed using an mild alkaline solution, entrained with air flow and absorbed in an excess of sulphuric acid solution. The solution collected is titrated with a sodium hydroxide solution in the presence of the methyl red indicator, or the mixed methyl red/methylene blue indicator.
- Nitric nitrogen content: is determined through calculation
- Nitrogen from urea content: according to EC Regulation no. 2003/2003 method 2.6.2. It is determined using the gravimetric method with xanthodrol. The xanthodrol forms a precipitate with urea; the co-precipitated biuret is considered as nitrogen from urea. In the case of complex fertilizers, the error is small, its concentration is usually low, in absolute value.
- Ratio between % of urea and % of ammonium nitrate in UAN: through calculation.
- The biuret is determined according to SR EN 15479:2009.EC Regulation no. 2003/2003 method 2.5., point 7.2 is used to eliminate ammonium ions present in the solution, ammonia displacement using an excess of sodium hydroxide solution, ammonia entrainment with water vapours. The next step is determining the biuret from UAN liquid fertilizers, using the spectrophotometric method 2.5. In an alkaline environment, in the presence of sodium and potassium tartrate, the biuret and the divalent copper form a purple III valent copper complex. The optic density of the solution is measured at a wavelength of 546 nm.
- Alkalinity: according to SR ISO 1593:1999 (standard canceled). Free alkalinity is given by free ammonia from the product. The testing method is based on determining free ammonia through neutralisation with acid, using an mixed indicator solution.
- pH according to STAS 8619/3-90, with the help of a laboratory pH-meter.
- Corrosion inhibitor concentration is determined through the Nalco method indicated by its supplier.
- The density at a temperature of 15°C is determined according to SR EN ISO 12185:2002, using an electronic densimeter.
- Freezing point / crystallization is determined according to STAS 8671-78 point 4.4.2. The sample is introduced in a test tube which is inserted into another recipient with alcohol and it is immersed in a cooling mixture at t min of -30°C. The thermometer is read with alcohol, introduced into the test tube, at a temperature that shows a constant value.
4. **Quality inspection**
The quality of the product is determined during production stage, at the final store and during loading in tanks for delivery.
Delivery batches are formed, and the supplier keeps the analysed counter-samples.
A lot about cca. 600 t.
Each delivery is accompanied by the conformity statement.
At the client’s request, the product is accompanied by a test report, and, when expressly requested, the determination of the extended incertitude of the test results.

5. **Tolerances**
According to EC Regulation no. 2003/2003 Annex II; tolerances are negative values in mass percentage.

N from nitrate-urea solution 0, 6%

6. **Packaging**
The product is loaded in carbon steel or stainless steel recipients.
The accompanying documents must be edited in at least one official language of the European Union (for export).
Identification data for the product delivered in bulk or in packages that exceed 100 kg is mentioned in the accompanying documents:
- Name of the product: UAN type liquid fertilizers.
- Declared content for each nutrient: TOTAL NITROGEN N; AMMONIACAL NITROGEN; NITRIC NITROGEN; UREA NITROGEN expressed in mass percentage without decimals.
- The nutrients must be declared in words as well as in chemical symbols. For example: Nitrogen (N).
- Net mass for the fertilizer.
- Name or trademark and the producer’s address
- Name, commercial name or trademark and the address of the person responsible for selling the product, established in Romania (GD 716/2001, paragraph e, page 34) or in the European community (for export).

7. **Handling, storage, transport and guarantees**
The product is stored in carbon steel or stainless steel recipients.
When handling the product, do not use brass, bronze or copper devices.
Transport is carried out in railroad tanks or car tanks.
Storage and transport are carried out at temperatures above the crystallisation temperature of the product.
The product does not have ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road), RID (European Agreement concerning the International Carriage of Dangerous Goods by Rail) classification for transport, IMDG (International sea transportation of hazardous substances).

Term of validity:
- 12 months from the date of loading for transport, mentioned in the accompanying documents, in compliance with specified transport and storage conditions.
8. Security measures
Personnel involved in loading and transport must be equipped by the beneficiaries with personal protective equipment consisting of: anti-acid gloves, face shields or goggles. In case of eye contact, wash immediately and repeatedly with plenty of water, and seek specialised medical help.
In order to avoid the effects on the skin, washing is mandatory after handling the product. The product is not flammable or explosive.
The security of the storehouses must be ensured in order to avoid accident such as: discharges and liquid fertilizer loses (that can severely affect the environment).
In case of events/accidents call immediately the local fire brigade.