**SUBSTANCE TS-2**

**SPECIFICATIONS**

**TU 30E-2015**

These specifications extend to the substance Ts-2 (1,4,5,8-tetra nitroso-1,4,5,8-tetra-aza-decaline) intended for production of gunpowder artillery APTs-235P.

Formula of the substance Ts-2



Empirical formula of C6H10N8O4

Molecular weight on the international atomic masses of 1973 – 258,198.

1 Technical requirements

1.1 The substance Ts-2 has to conform to requirements of these specifications and be made according to the technological documentation approved in accordance with the established procedure.

1.2 The materials applied to production of the substance Ts-2 have to conform to requirements of the normative documents existing on them and have the documents of manufacturer certifying compliance of materials to these documents.

1.3 On physical and chemical indicators the substance Ts-2 has to meet the standards specified in table 1.

Table 1-Physical and chemical indicators

|  |  |  |
| --- | --- | --- |
| Name  indicator | Norm | Method  tests |
| 1 Appearance | Damp crystal powder of white or slightly yellowish color. Pointed inclusions within norm on a mass fraction of ashes are allowed | According to item 4.3 of the presents TU |
| 2 Mass fraction of moisture, %, not less | 30 | According to item 4.4 of the presents TU |
| 3 Chemical firmness on manometrical test at (1105) 0C ±(a gain of pressure of flying and gaseous products of decomposition) for 5 h, kPa (mm Hg.), no more \* | 8(60) | According to item 4.5 of the presents TU |
| 4 A mass fraction of substances, soluble in acetone, %, no more | 0.8 | According to item 4.6 of the presents TU |

|  |  |  |
| --- | --- | --- |
| 5 Decomposition temperature, 0C | 202- 210 | According to item 4.7 of the presents TU |
| 6 Mass fraction of ashes, %, no more | 0,2 | According t item 4.8 of the presents TU |
| 7 The Srednemassovy size of particles on the laser analyzer of particles "Mikrosayzer 201s", micron, no more | 10,9 | According to item 4.9 of the presents TU |
| \* - If the gain of pressure of flying gaseous products of decomposition for 5 h is more than 8 kPa (60 mm Hg.), but does not exceed 10 kPa (80 mm Hg.), tests continue up to 14 h. The norm of a gain of pressure in this case has to be no more than 20 kPa (150 mm Hg.) | | |

1.4 Explosive characteristics of Ts-2 solid are given in appendix A.

1.5 Packing

1.5.1 For intra factory transportation the substance Ts-2 is packed into clean plastic bags. The polyethylene bag insert is placed in a paper bag.

1.5.2 Plastic bags the substance Ts-2 are given up a twine or a cord. When setting a bag from it, force out air and tie at distance from 15 to 20 cm from the substance Ts-2, bending on 1800, and once again tie in "forelock".

Bags paper are tied a twine or a cord and sealed up a metal or plastic seal. Net weight in the specified types of a container has to be no more than 30 kg.

1.5.3 At interfactory transportation the substance Ts-2 is in addition packed into drums by the cardboard navivny or other types of a container ensuring safety of a product.

1.6 Marking

1.6.1 Attach the label containing to each bag:

- name and (or) trademark of manufacturer, its location;

- designation of these specifications;

- name of a product;

- number of the general party and number of private party;

- room of the place in private party;

- net weight of a damp product;

- weight - net a dry product;

- date (month and year) of production;

- surname of the packer.

1.6.2 At interfactory transportations in addition apply on a transport container:

- the sign of danger with the indication in it of a class 1, subclass 1.1, groups of compatibility of D;

- conditional number of freight according to "The list of dangerous freights of the first class" - 137 in an equilateral triangle;

- "To protect the handling instruction from sunshine".

The marking characterizing transport danger of freight is put:

- on forward and face walls of a container on places, free from marking;

- on a container cover if marking is not placed on sidewalls. In this case in an interdoorway of the car the table with marking of freight is hung out.

1.7 To transportation show a product with a mass fraction of moisture not less than 30%.

2 Safety requirements

2.1 The substance Ts-2 on danger degree at transportation belongs to the class 1, a subclass 1.1, group of compatibility of D.

2.2 The substance Ts-2 on extent of impact on a human body belongs to the class of moderate and dangerous connections. Lethal dose of LD50 of 2000 mg/kg of mass of an animal. Maximum allowable concentration in air of a working zone is 5 mg/m3.

2.3 The substance Ts-2 in a dry form - the high-disperse raising dust powder, vzryvo-is also flammable. Explosive characteristics are given in the appendix B.

2.4 Rooms in which carry out works with solid have to be supplied with a supply and exhaust ventilation and emergency firefighting equipment. For suppression of a product use the sprayed water, carbon dioxide and foamy fire extinguishers.

2.5 The workers occupied on production of the substance Ts-2 have to be provided with overalls, rubber gloves and means of protection of respiratory organs and eyes.

2.6 All operations connected with drying of the substance Ts-2 and processing of a dry product carry out in the conditions excluding blows, hit between the rubbing surfaces with use of the tool which is not giving a spark. It is forbidden to use an open flame, incendiary devices. The used equipment has to be grounded.

2.7 The substance Ts-2 with a mass fraction of moisture not less than 30% at a temperature from minus 50 to plus 50 0C is tolerant to mechanical influences.

2.8 Wit when receiving and processing substance destroy in the field of burning by parties weighing no more than 100 kg together with the household waste, sawdust moistened with fuel oil.

2.9 When receiving and processing the substance Ts-2 measures have to be taken for prevention of its hit in sewage.

2.10 All works connected with production, test, use, storage and destruction of the substance Ts-2 carry out according to the existing "Service regulations of the enterprises …", approved in accordance with the established procedure.

3 Acceptance procedures

3.1 Acceptance of the substance Ts-2 is carried out with the following additions and specifications:

- The substance Ts-2 accepts Quality Department of manufacturer in lots;

- The mass of party should not exceed 5 t;

- The party is completed from private parties by sampling. Pointed tests select from the filter funnel or from 10% of tare places (but not less than three places) private party. Average pointed tests of private parties divide into two parts. One part is analyzed on two indicators of table 1: firmness on manometrical test at a temperature of (1105) 0C ±and a mass fraction of substances, soluble in acetone. Make the joint test of the general party of the second part of private parties. This test is analyzed on all physical and chemical indicators of the substance Ts-2 of table 1.

3.2 On packing specify number of the general party and private party.

The passport is made on the general party.

Specify numbers of the private parties which entered into the general party in the passport of the general party.

3.3 A lot of the joint test of private party has to be from 100 to 150 g.

A lot of the joint test of private party taking into account control test has to be from 200 to 250 g.

3.4 Test and control test of the substance Ts-2 select the probe (on all height the filter funnel or a bag). The sack control test is given up in "forelock" and put in the second polyethylene sack which is also tied in "forelock". Control tests seal up a seal of Quality Department and store within 12 months.

3.5 In addition specify in the label of control test net weight (damp).

4 Test methods

4.1 Sampling

For carrying out tests for compliance of indicators to the requirements provided in table 1, sampling is made as for brisant explosives III of group.

4.2 Preparation of tests for tests

Drying of the substance Ts-2 is carried out as follows: from 12 to 15 g of a product place a thin layer on a tray from aluminum foil and dry in a drying cabinet at a temperature of (505) 0C±. During drying test is periodically carefully pounded a rubber stopper and mixed. Upon termination of drying the product is placed in an eksikator.

4.3 Determination of appearance

The appearance is checked visually.

4.4 Definition of a mass fraction of moisture

Definition of a mass fraction of moisture is carried out by MT-36E's technique.

4.5 Determination of chemical firmness on manometrical test

Determination of chemical firmness of the substance Ts-2 on manometrical test is carried out by MT-34E's technique.

4.6 Definition of a mass fraction of substances, soluble in acetone Definition of a mass fraction of substances, soluble in acetone, carry out by MT-37E's technique.

4.7 Determination of temperature of decomposition

Determination of temperature of decomposition is carried out by MT-38E's technique.

4.8 Definition of a mass fraction of ashes combustion by nitric acid

Definition of a mass fraction of ashes by combustion by nitric acid is carried out by MT-39E technique.

4.9 Determination of the srednemassovy size of particles of the substance Ts-2

Determination of the srednemassovy size of particles of the substance Ts-2 is carried out on the laser analyzer of particles "Mikrosayzer 201s" by MT-40E's technique.

5 Transportation and storage

5.1 The substance Ts-2 is transported in packing of manufacturer by the railway or motor transport according to "Rules of transportations of the dangerous freights" operating on this type of transport.

5.2 Use the motor transport to intra factory transportation.

5.3 Use motor or railway transport to interfactory transportation.

5.4 Security measures at emergence of accidents on railway transport and measures for their elimination have to be taken according to an emergency card.

5.5 The substance Ts-2 is stored in a container of manufacturer in the covered warehouse far from heating devices and action of direct sunshine.

5.6 The product which froze at transportation or storage before use thaw in rooms at a temperature not above plus 40 0C.

The frozen product is allowed to be used without preliminary thawing, for this purpose the substance Ts-2 is loaded into the mixer with the water having temperature plus 40 0C is not higher, maintain before full thawing, then mix and use in the form of suspension.

5.7 In the course of long storage decrease in a mass fraction of moisture to 30% is allowed. The possibility of use of the substance Ts-2 less than 30% decides by the enterprise consumer in coordination with the developer on humidity.

6 Manufacturer's guarantees

6.1 The manufacturer guarantees compliance of the substance Ts-2 to the requirements of these specifications at observance of conditions of transportation, storage established by these specifications.

6.2 A warranty period of storage of the substance Ts-2 – 12 months from the date of acceptance.

6.3 After a warranty period the substance Ts-2 is subject to test on indicators of the 3 and 5 table 1 and it is considered suitable at compliance of indicators to requirements of these specifications within 6 months from the moment of carrying out tests.

APPENDIX A

(help)

|  |  |  |
| --- | --- | --- |
| The defined characteristic | Type of the tested product | Results of tests |
| 1 Sensitivity to blow on a copra for small hinge plates on the lower limit, mm, in the device No. 2 at a temperature of (15-20) 0C with freight of 10 kg | Dry powder  Damp powder | N 0of =100-125 mm  N 0of =500 mm |
| 2 Sensitivity to friction of unaccented character on the I-6-2 device at a temperature of (15-20) 0C, MPa (kgf/cm2) | Dry powder  Damp powder | 520 min.-1  P> 0176 (1760)  520 min.-1  P300 0>(3000)  2000 min.-1  É = 0(((430) |
| 3 Sensitivity to friction at shock shift on the K-44-3 device at a temperature of (15-20) 0C, MPa (kgf/cm2) | Dry powder | É = 0((((2000) |
| 4 Critical diameter of a detonation, dk, mm, at a temperature of (15-20) 0C | Dry powder | Between 20 and 30 |
| 5 Trotyl equivalent,α | Dry powder | 0,9-1,0 |

Explosive characteristics of Ts-2 solid