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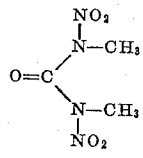
1,3-DINITRO-1,3-DIMETHYL UREA

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The present invention relates to 1.3-dinitro-1.3-dimethyl urea and the production method thereof, and further explosive compositions characterized by containing same.

1.3-dinitro-1.3-dimethyl urea is a compound in the state of a liquid nonvolatile at normal temperature, which is obtainable by nitrifying 1.3-dimethyl urea by the medium of concentrated nitric acid or concentrated nitric acid and acetic anhydride, having a structural formula as follows:



This is a compound unknown in the heretofore published literature, containing a great amount of oxygen effective as a gunpowder and it can be easily exploded in itself by regular industrial detonation cap, producing an explosive power bigger than that of tetryl. Further, it is extremely insensitive to shock and friction and according to the sensitivity test, conducted by a falling hammer, it is shown that its inexplosive point is ten times higher than nitroglycerin. Still further, it has a nature of dissolving numerous organic compounds, especially, when admixed with nitrocellulose, it yields a colloidal matter; this colloidal matter can be brought to any solidity, by varying the ratio of admixture with nitrocellulose.

The present invention is characterized by the fact that 1.3-dinitro-1.3-dimethyl urea has such an excellent feature as material for gunpowder and powder compositions, obtained by adding a small amount thereof to powder matter such as ammonium nitrate or ammonium perchlorate to be effective as explosives, and also a colloidal matter obtained by admixing 1.3-dinitro-1.3-dimethyl urea with nitrocellulose, or powder or colloidal compositions obtained by compounding a liquid or powder matter to such colloidal matter to be effective as explosives, shooting agent for guns and rocket propelling agent, thus not only providing an excellent feature, but rendering its production extremely safe and easy.

Heretofore, a colloidal matter obtained from organic nitric acid ester and nitrocellulose or one with addition thereto of various compounding agents has widely been used as gunpowder, however, it is commonly known that nitroglycerin or nitroglycol is an extremely unsteady compound liable to blast by a slight shock or friction, accompanying a considerable danger in its production and handling. And therefore, many attempts have been made to produce colloidal gunpowders by employing matters of better stability as materials, however, in most examples resins of bad oxygen balance have been adopted as gelatinizer or plasticizer and those gunpowders have generally been found considerably inferior at the point of capacity.

Whereas, in the present invention the subject 1.3-dinitro-1.3-dimethyl urea has a fine property as materials of gunpowder, especially a colloidal one, as described above, and the various explosive compositions comprising same are safe and easy in the production thereof with capacity superior to others when compared with heretofore known gunpowders employing nitroglycerin, therefore the great value of the present invention is readily apparent.

Example 1

This example relates to the production method of 1.3-dinitro-1.3-dimethyl urea.

15 g. of 1.3-dimethyl urea is added bit by bit to the admixture of concentrated nitric acid of 45 u. and acetic anhydride of 60 u., while agitating it, keeping the temperature at about 5° C., and after said addition agitation is still continued for 30 minutes, and thereafter ether is extracted by pouring it in ice water. After washing the ether solution in the order of water, dilution of the solution of sodium carbonate and water, ether is distilled out at normal temperature, and when the residue of oil matter is dried by anhydrous sodium sulfate a liquid almost uncolored can be obtained having a weight of 26 g. In case of using concentrated nitric acid only in the nitrification, the yield is about 18 g. under the same conditions.

Elementary analysis values of the product are: C =20.58%, H=3.16%, N=31.52%, and the value of molecular weight measured by means of an antifreezing method employing benzene is 172.3, thus well corresponding, respectively, with a theoretical value as of $CO(N.NO_2.CH_3)_2$.

Example 2

The following examples are respectively relating to explosive compounds comprising 1.3-dinitro-1.3-dimethyl urea.

Powder compositions consist of ammonium nitrate 60 g., ammonium perchlorate 30 g. and 1.3-dinitro-1.3-dimethyl urea 10 g. Being adequate as explosives, the angle of deviation of mortar according to the ballistic mortar test is 19°20′.

Example 3

A colloidal composition is composed of 1.3-dinitro-1.3-dimethyl urea 90 g. and nitrocellulose 10 g. Being adequate as explosives, the angle of deviation of mortar according to the ballistic mortar test is 18°20′.

Example 4

A colloidal composition of plasticizing property is obtained by admixing ammonium nitrate 50 g. with colloidal matter consisting of 1.3-dinitro-1.3-dimethyl urea 31 g., nitroglycerin 15 g. and nitrocellulose 4 g. Being adequate as explosives, the angle of deviation of mortar according to the ballistic mortar test is 19°04′.

Example 5

A solid colloidal composition is composed of 1.3-dinitro-1.3-dimethyl urea 43 g., nitrocellulose 50 g. and ethylcentralite 7 g. Being adequate as shooting agent for guns and rocket propelling agent, even under high pressure in the combustion chamber of rocket combustion quality the composition is stabilized without fear of explosion.

Example 6

A colloidal composition with plasticizing property consists of 1.3-dinitro-1.3-dimethyl urea 31 g., nitrocellulose 4 g. and ammonium nitrate 65 g. Being adequate as explosives, the angle of deviation of mortar according to the ballistic mortar test is 18°16′.

Example 7

A colloidal composition with plasticizing property is composed of 1.3-dinitro-1.3-dimethyl urea 33 g., nitrocellulose 5 g., ammonium nitrate 45 g. and ammonium perchlorate 17 g. Being adequate as explosives, the angle of deviation of mortar according to the ballistic mortar test is 18°50′.

Example 8

A powder composition consists of 1.3-dinitro-1.3-dimethyl urea 16 g., nitrocellulose 2 g. and ammonium nitrate 82 g. Being adequate as explosives, the angle of deviation of mortar according to the ballistic mortar test is 18°12′.

Further, the ballistic mortar test was conducted by using a sample of 10 g., and the angle of deviation of mortar for trinitro toluene is 15°24′ under the same conditions.

While we have discovered several embodiments of the present invention, it is to be understood that these embodiments are given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and tthe claims.

What we claim is:

1. 1.3-dinitro-1.3-dimethyl urea.

2. A method of producing 1.3-dinitro-1.3-dimethyl urea comprising the step of nitrifying 1.3-dimethyl urea with concentrated nitric acid at a temperature of below 30° C.

3. A method of producing 1.3-dinitro-1.3-dimethyl urea comprising the step of nitrifying 1.3-dimethyl urea with concentrated nitric acid and acetic anhydride at a temperature of below 30° C.

References Cited in the file of this patent

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