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SAFE EXPLOSIVE CONTAINING DICYANOFUROXANE AND METHOD

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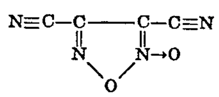
ABSTRACT OF THE DISCLOSURE

The present invention relates to a unique explosive composition, more precisely to an organic composition of carbon, nitrogen, and oxygen, viz., dicyanofuroxane, a compound which has been found to be a safe castable material for forming shaped explosives.

Dicyanofuroxane is a composition having the chemical with the structure



and hereinafter dicyanofuroxane shall be designated by the abbreviation, DCFO. To the best of our knowledge, DCFO had not, heretofore, known utility as an explosive nor for any other use although the material has before been produced in small quantities.

It is an object of the invention to provide a new safe explosive.

It is another object of the invention to provide a new use for dicyanofuroxane, said use being as a safe explosive.

The novel features that are considered characteristic of the invention are set forth in the appended claims; the invention itself, however, both as to its organization and method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment.

DCFO is produced most readily by reacting nitric acid with cyanoacetic acid in a suitable solvent, such as trifluoroacetic or trichloroacetic acid, at 40° C.; the reaction is generally complete after a few hours. After the reaction step, DCFO in the acid solution is separated by selective extraction from the acid phase by contacting it with methylenedichloride or chloroform or some similar solvent. After the extraction step, the solvent is vaporized under vacuum leaving DCFO.

DCFO when used as an explosive composition is intended as an alternative to TNT, nitroglycerin, or similar explosives; DCFO contains considerable explosive energy, and yet it is extremely stable and safe, being insensitive to heat (below its boiling point of 200° C.) and to impact.

For example, it may be melted at the low temperature of 40° C. and thereby is extremely attractive as a material to be shaped into any desired form; in particular, the low melting point and stability make it an attractive explosive for forming complex shaped geometries. It has been found to be insensitive to impact; in the standard Bureau of Explosives apparatus, 0.01 gram of DCFO was spread on a hard steel plug and was subjected to impacts by a 2 kg. weight from a 30 inch height; no explosion occurred.

Yet, when detonated in a liquid and/or solid form by the addition of energy, such as heat, through an electrical resistance means, or preferably, by means of conventional blasting caps DCFO exhibits considerable explosive force.

Detonation tests were performed on one inch cubes of DCFO. Specifically, the cubes, weighing about 25 grams, were positioned on a one-inch thick steel plate. An electric blasting cap (both #6 and #8 caps were tested) was placed on top of the DCFO and the cap electrically fired. Both the #6 and #8 cap tests produced detonations of high order, and the detonations produced indentations approximately 1/16 inch deep; it was estimated that DCFO possessed the same explosive power as Du Pont Detasheat D Sheet explosive. In another test, liquid DCFO was kept stably above its melting point for a period of time, and detonated with a #8 blasting cap; the explosive power was essentially identical to that of solid DCFO. In other tests, it was determined that DCFO was thermally stable at all temperatures below its boiling point, 200° C.

The blasting caps perform their conventional function of supplying an impulse of energy which, when absorbed by the DCFO, causes the DCFO to become unstable and explode. A relatively large energy impulse, such as produced by a blasting cap, is required because of the fundamental stability of DCFO. The detonation process is not, however, dependent on the sole use of blasting caps. Other impulse energy generators may be used.

Other explosive parameters of DCFO have also been determined. The average detonation velocity was found to be 23,000 f.p.s., the critical detonation propagation diameter is 0.040 inch (or smaller), and the brisance obtained from plate dent tests was found to be about 0.85 that of cast TNT. One other test, its sensitivity to bullet detonation, showed that a volume of DCFO could not be detonated by the impact of a 50 calibre machine gun bullet.

The various features and advantages of the invention are thought to be clear from the foregoing description. Various other features and advantages not specifically enumerated will undoubtedly occur to those versed in the art, as likewise will many variations and modifications of the preferred embodiment illustrated, all of which may be achieved without departing from the spirit and scope of the invention as defined by the following claims.

We claim:

1. A method of creating an explosion comprising the step of providing a quantity of dicyanofuroxane (DCFO) and adding energy to the DCFO to cause it to become unstable and to detonate.

2. A method as described in claim 1 wherein said explosion is initiated by firing a blasting cap in the proximity of the DCFO.

3. A method as described in claim 2 wherein the DCFO is at a temperature below its boiling point prior to detonation.

4. An explosive material consisting essentially of dicyanofuroxane in combination with an impulse energy generator capable of supplying energy in an amount necessary to detonate the dicyanofuroxane.

5. An explosive material as defined in claim 4 wherein the impulse generator is a blasting cap.

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