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EXPLOSIVE AND PROCESS OF MAKING SAME.

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To all whom it may concern:

Be it known that I, ROBERT C. MORAN, a citizen of the United States, and a resident of Woodbury, in the county of Gloucester and State of New Jersey, have invented certain new and useful Explosives and Processes of Making Same, of which the following is a specification.

My invention relates particularly to a process for producing a new explosive of advantageous character and the product thereof. The object of my invention is to provide new and useful explosive compounds suitable for use in detonators and so-called booster charges. My process furnishes a simple and economical means of producing new explosives of the nitramine type and having a side chain attached to the amino group comprising a nitric ester of an aliphatic alcohol.

I have discovered that the condensation product of a primary oxyamine with dinitrochlorbenzene nitrates very readily in the presence of sulphuric and nitric acid, forming a compound having a plurality of nitro groups attached to the ring, a nitramine radical, and a side chain, attached to the amino group of said radical, comprising a nitric ester of an aliphatic alcohol. For example, if I condense 2, 4-dinitrochlorbenzene with amino-ethyl alcohol, I obtain dinitrophenylamino-ethanol which on nitration yields trinitrophenyl-nitramino-ethyl nitrate. Although the exact details of the various steps of my process may be varied, I have found the following to yield a very satisfactory explosive compound:—

100 parts by weight of 2, 4-dinitrochlorbenzene are dissolved in 510 parts of 95% alcohol. 30 parts of amino-ethyl alcohol are then added and the solution warmed to 70° C. 20 parts of NaOH are dissolved in 30 parts of water and this solution added slowly with agitation keeping the temperature at 70°–80° C. The reaction mixture is then cooled and filtered. The filtrate is concentrated to throw out the crystals of dinitrophenylamino-ethanol. This product is then dissolved, one part to 10 parts, in 95% H_2SO_4, keeping the temperature below 35° C. and added slowly with agitation to 3 parts of nitric acid of 1.47 specific gravity keeping the temperature at 30° to 35° C. After addition is complete the mixture is held at 40° to 50° C. for ½ hour to 1 hour. The final product trinitrophenyl-nitramino-ethyl nitrate gradually separates out and is recovered by drowning in water, separated, washed and neutralized by any of the well known methods.

The compound which I obtained by the above described process was a yellow powder which, when recrystallized from benzene, gave a melting point of 125°–126° C. The percentage of nitrogen as determined on a nitrometer was 7.45 as compared to 7.52%; the theoretical nitrogen content of trinitrophenyl-nitramino-ethyl nitrate. When decomposed with sodium carbonate and neutralized with hydrochloric acid, the new compound yielded picric acid, indicating three nitro groups attached to the ring. The compound flashed when heated on a steel spatula and detonated with great violence when primed with fulminate of mercury.

This new explosive is particularly well adapted for use in blasting caps and in so-called booster charges, or in any of the numerous explosive devices for which such explosives as trinitrotoluene, picric acid and tetryl have found usefulness. For example, in a blasting cap shell, I have found that a compressed charge consisting of 3.5 grains of trinitrophenyl-nitramino-ethyl nitrate in the base of the shell and a primer of 5 grains of a 90–10 mixture of fulminate and chlorate with a superimposed inner capsule exhibits an explosive force entirely comparable with that given by tetryl loaded and fired under the same conditions.

While I have described my invention above in detail, I wish it to be understood that many changes may be made therein without departing from the spirit of my invention. For example, I do not wish to confine myself to any particular method of condensation or nitration, or to the use of any particular chlor aromatic compound or aliphatic amino alcohol. Thus, instead of dinitrochlor-benzene I may use dinitrochlortoluene, and in place of amino-ethyl alcohol, I may use other saturated or unsaturated monohydric alcohols containing, preferably,

less than five carbon atoms, such as amino-methyl alcohol, amino-propyl alcohol, amino-propenyl or iso-propenyl alcohol, etc. The nitration should preferably be allowed to proceed until a nitro group as well as a nitrate group has been introduced into the nitrophenylamino-alkanol.

I claim:

1. A process of producing an explosive compound which comprises condensing an amino aliphatic alcohol with a nitrochlor aromatic compound and nitrating the resulting product of condensation.

2. A process of producing an explosive compound which comprises condensing amino-ethyl alcohol with a nitrochlor aromatic compound and nitrating the product of condensation.

3. A process of producing an explosive compound which comprises condensing amino-ethyl alcohol with dinitrochlorbenzene and nitrating the resulting product of condensation.

4. A process of producing an explosive compound which comprises nitrating an aromatic amine containing an alcoholic side chain attached to the amino group.

5. A process of producing an explosive compound which comprises nitrating dinitrophenylamino-ethanol.

6. An explosive comprising an aromatic nitramine compound having a plurality of nitro groups attached to the ring, and an aliphatic radical attached to the amino group comprising a nitric ester of an alcohol.

7. An explosive comprising the organic product obtained by nitrating an aromatic amine containing an alcoholic side chain attached to the amino group.

8. An explosive comprising a nitro-aryl-nitramino-alkyl nitrate.

9. An explosive comprising a nitro-aryl-nitramino-alkyl nitrate, the alkyl radical of said nitrate containing from 1 to 4 carbon atoms.

10. An explosive comprising trinitrophenyl-nitramino-alkyl nitrate, the alkyl radical of said nitrate containing from 1 to 4 carbon atoms.

11. An explosive comprising a nitrophenyl-nitramino-ethyl nitrate.

12. An explosive comprising trinitrophenyl-nitramino-ethyl nitrate.

13. A booster charge comprising a nitro-aryl-nitramino-ethyl nitrate, the aryl groups having a benzene ring nucleus.

14. 2, 4, 6-trinitrophenyl-nitramino-ethyl nitrate.

15. A compound consisting essentially of trinitrophenyl-nitramino-ethyl nitrate, said compound having, in powdered form, a yellow color and, when recrystallized from its solution in benzene, a melting point of 125°–126° C.

In testimony whereof I affix my signature.

ROBERT C. MORAN.