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(54) **PRESSABLE EXPLOSIVE COMPOSITION**

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ABSTRACT

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The present invention relates to low-sensitivity, pressable, aluminum-containing explosive compositions and a method of producing them. The compositions comprise between 45 and 95% by weight explosive crystals, between 5 and 55% by weight passivated aluminum and a binder that is chosen such that the composition satisfies the requirements for low-sensitivity explosives (IM requirements). Due to the fact that the aluminum is passivated, the composition can be produced by the use of a well-known water slurry process.

PRESSABLE EXPLOSIVE COMPOSITION

[0001] The following invention relates to pressable aluminum-containing explosive compositions. More particularly, the invention relates to low-sensitivity, pressable aluminum-containing explosive compositions and a method for producing them.

[0002] 1. Background

[0003] In recent times, there has been an increased interest in aluminum-containing explosive compositions due to the fact that these provide an explosive having increased explosive pressure (so-called "enhanced blast explosives" or otherwise known as "thermobaric explosives"). The reason for this increased interest is that there is a greater need for charges that can be effectively used against bunkers and tunnels. For this purpose, an explosive is needed that can release energy over a longer period than is achieved by traditional compositions having pure high explosives. The use of aluminum to increase the effect in an explosive has long been known, and was first patented already in 1900 by G. Roth (DE 172,327).

[0004] There has also been much focus in recent times directed towards low-sensitivity ammunition ("Insensitive Munition" also called simply "IM"). The requirements for IM dictate that it should be safe to store and handle ammunition in all situations, both in times of peace and conflict. Much work has therefore been directed towards improving the stability of the explosive that is used in the ammunition.

[0005] Pressable explosive compositions that contain aluminum and high explosives such as for example 1,3,5,7-tetranitro-1,3,5,7-tetraaza cyclooctane (HMX), and 1,3,5-trinitro-1,3,5-triaza cyclohexane (RDX) have been known for some time. These have generally been explosive compositions using wax as the binder. Such wax-based compositions do not however satisfy the requirements for explosives for low-sensitivity ammunition.

[0006] Traditionally, pressable explosive compositions can be made in an aqueous environment by what one skilled in the art knows as a water slurry process. Because of safety considerations, aluminum-containing compositions are not ordinarily made in water since aluminum reacts exothermally with water under formation of aluminum hydroxide and hydrogen gas. It has therefore been more common to mechanically mix in aluminum with this type of composition. This can result however in a mixture of explosive and aluminum that is not homogenous in the charges after these are pressed.

[0007] 2. Prior Art

[0008] There exists several varieties of explosive compositions containing aluminum of the type known by one skilled in the art as cast/curable ("cast-cured") or melt/pourable ("melt-pourable") compositions. These compositions are well-suited for producing large charges with a diameter of over 100 mm. Smaller charges can also be made from these compositions, but this is a relatively costly process and for smaller charges a pressing process is much more economical. There exists however many fewer pressable aluminum-containing explosive compositions than is the case for cast-cured or melt-pourable compositions. Almost all pressable aluminum-containing compositions, with few exceptions, are produced using a mechanical mixing of aluminum.

[0009] Stephen L. Jones et al. presented a pressable aluminum-containing composition (called PBXIH-18) at a symposium in Florida in 2003 (2003 Insensitive Munitions and Energetic Materials Technology Symposium 10-13 Mar. 2003, Orlando USA). This composition is comprised of HMX, aluminum, Di-2-ethyl hexyl adipat (also called Di-octyl adipat or simply DOA) and HyTemp 4454 (Polyacrylic binder sold by Zeon Chemicals). The composition of this material in terms of percentage weight of HMX, aluminum and binder was not specified and is still unknown. This material was developed as a possible replacement for compositions comprised of Comp-A3 to which was added 30% by weight aluminum (Comp-A3 is a well-known RDX composition with wax as the binder). These Comp-A3/aluminum compositions are produced by mechanically mixing aluminum together with Comp-A3 and has been used in large quantities in weapons systems. A disadvantage with such mechanical mixing is that the aluminum and explosive are not mixed well enough and after pressing the result is charges where the aluminum and the explosive are not homogeneously dispersed. Another disadvantage with this Comp-A3/aluminum composition is that it does not satisfy the requirements for use in low-sensitivity ammunition. PBXIH-18 was therefore developed to satisfy the requirements for the explosive. The process for making PBXIH-18 uses a slurry of explosive and aluminum in a perfluorinated solvent PF-5080 (essentially completely fluorinated octane compositions, sold by 3M). The process resembles what one skilled in the art refers to as a water slurry process. However, water is replaced by PF-5080 because of fear for reaction of aluminum with water.

[0010] The process described by Jones et al. is economically disadvantageous compared with a standard water slurry process because it utilizes PF-5080 which is much more expensive than water. It is true that PF-5080 can be recycled, but this requires an extra purification step in the process before it can be reused. It is also unrealistic to expect to recover 100%. PF-5080 is also not environmentally attractive. Such perfluorinated compositions are particularly stable and therefore will not be decomposed naturally. The manufacturer 3M recommends therefore to avoid the discharge of PF-5080 to the environment. This process is further disadvantageous in that it requires the use of dry crystals of explosive. This is disadvantageous from a safety perspective in that a much greater risk is associated with handling dry explosive crystals as opposed to moist. Explosive crystals of HMX or RDX cannot be transported dry (they must contain a minimum of 15% water) and they come directly out of the production process as moist. Predrying of explosive crystals is economically disadvantageous since this requires both time energy and equipment.

[0011] Joseph Turci et al. (U.S. Pat. No. 5,472,531) describes an aluminum-containing composition that is made by kneading together an explosive, aluminum and a binder together with a volatile solvent in a kneading machine, and thereafter extruding out the product which is then cut up in order to make a powder of the composition. This process has several disadvantages, among others requiring the use of an expensive kneading machine and extruding equipment. A more safety related disadvantage is that this process also uses a pre-dried explosive. Transportation and handling of dried HMX or RDX are, as described previously, connected with a risk. In addition to the increased risk, there is also an

economic disadvantage in that predrying the explosive requires time, energy and equipment.

[0012] Stephen M. Nicolich et al. presented examples of pressable aluminum-containing compositions at a symposium in Florida in 2003 (2003 Insensitive Munitions and Energetic Materials Technology Symposium 10-13 Mar. 2003, Orlando USA). These compositions are based on CL-20 (2,4,6,8,10,12-hexanitro-2,4,6,8,10,12-hexaazaisowurtzitane) as the explosive and CAB (cellulosic acetate butyrate) as the polymer with BDNPA/F (1:1 mixture of Bis(2,2-dinitropropyl)acetal and Bis(2,2-dinitropropyl)formal) as a softener. This uses a fluid-slurry process to make the compositions, wherein the fluid can be water. They state however that the quality of aluminum that is used cannot be used in water over 30° C. They must therefore remove the solvent by a method other than distillation, but how this is accomplished is not described. Nicolich et al. is silent on whether the quality of aluminum is passivated at all, or with what it is passivated. The described compositions contain CL-20 as the explosive, which one skilled in the art knows as a substantially more sensitive explosive than HMX or RDX. One skilled in the art would therefore be unlikely to use this type of composition in a low-sensitivity ammunition. CL-20 is also very expensive as a result of the costly process of its manufacture.

[0013] Dyno Nobel ASA has for many years manufactured compositions based on RDX, wax and aluminum. This has been performed using passivated aluminum for the process and is based on an older French patent (FR 2 031 677). The French patent describes a process whereby by using passivated aluminum one can make compositions with wax and other binders so long as the binder contains an acidic group such as for example a carboxylic acid group or an acidic hydroxyl group such as for example phenol. The acidic group was necessary in order to coat the aluminum with wax and thereby be able to make a homogenous granulate of RDX, aluminum and binder. Without these acidic groups, it was only possible to coat the explosive with aluminum dust. The passivating of aluminum in this patent is based on warming up a suspension of aluminum in an aqueous solution of calcium bichromate or in an aqueous solution of mono-sodium phosphate and boric acid. The first-mentioned, so-called bichromated aluminum, was for years used as passivated aluminum. However, because of environmental reasons, restrictions were imposed against producing bichromated aluminum several years ago. As a result, it is now very difficult to acquire large quantities of this, and that which can be acquired is quite costly. Of course it is also because of environmental and health reasons quite unattractive to utilize such bichromated aluminum quality. Dyno Nobel has, for several years before the restrictions on bichromated aluminum, worked with alternate passivating methods. It was believed that it would be possible to pre-coat aluminum with for example wax or another binder. After several attempts in cooperation with aluminum suppliers, it was discovered that by precoating aluminum with 0.3% by weight isostearic acid, but not limited to isostearic acid or the 0.3% by weight, the result was that the aluminum was sufficiently stable in relation to water to be used safely in a water slurry process.

[0014] Based on aluminum that is passivated with 0.3% by weight isostearic acid, Dyno Nobel has produced large quantities of compositions with RDX, aluminum and wax by

a so-called standard water slurry process. The knowledge that isostearic acid can sufficiently passivate aluminum such that it can be used in a water slurry process has been withheld within the company as a trade secret. Nonetheless, these compositions do not satisfy present requirements for explosives for use in low-sensitivity ammunition (IM-requirements). There is a need therefore for new pressable compositions based on high explosives with aluminum and binders that satisfy, present IM-requirements.

OBJECTS OF THE INVENTION

[0015] It is therefore an object of the invention to provide a pressable hi explosive with aluminum and a binder that satisfies present requirements for low-sensitivity explosives (IM-requirements).

[0016] It is a further object of the invention to provide a method for producing such pressable high explosives with aluminum and a binder that satisfies present requirements for low-sensitivity explosives based on the manufacturing-friendly and relatively low risk method known as the water slurry process.

SUMMARY OF THE INVENTION

[0017] The objects of the invention are achieved by the features from the following description and claims.

DETAILED DESCRIPTION OF THE INVENTION

[0018] The present invention relates to a pressable explosive composition that comprises between 5% by weight and 55% by weight aluminum and between 45% by weight and 95% by weight HMX and/or RDX, the remainder being a binder. The binder that is used is of such a type that the explosive composition will satisfy the requirements for use in a low-sensitivity ammunition (IM-requirements). The binder can be, but is not limited to, a mixture of a polyacrylic elastomer such as HyTemp 4454 (marketed by Zeon Chemicals) and a softener. The softener can be, but is not limited to 2-diethylhexyladipat (also known as plasto-moll, dioctyl adipat or DOA). It would be apparent to one skilled in the art that the compositions according to the invention will, as a result of the aluminum content, provide an explosive with increased explosive pressure ("enhanced blast explosive"). Likewise, one skilled in the art understands that the use of an elastomeric binder, such as for example a HyTemp 4454/DOA mixture as used in the present invention, provides explosive compositions with appropriate characteristics such that they can be used in low-sensitivity ammunition. HMX- or RDX-based compositions with a binder-mixture of HyTemp 4454 and DOA have been in focus the last 10-20 years and have been shown to have quite good IM characteristics. Compositions with this binder system have therefore often been used in various weapons systems.

[0019] Compared to the prior art, the present invention allows the use of a press operation to produce charges that have increased explosive pressure and that can be used in low-sensitivity ammunition. One skilled in the art is aware of several advantages afforded by the use of a press operation as opposed to a casting process, whether cast-cured or melt-pourable. One of these is that a much higher production tempo is possible whereas a casting/stiffening process is

time-consuming. At the same time, pressing equipment is much cheaper than casting equipment. One skilled in the art will therefore appreciate the economic advantages of pressing charges as opposed to casting them so long as the charges do not have too large of a diameter, which is a limiting factor for pressable charges.

[0020] The present invention relates to a method for producing the aforementioned compositions by what is known by one skilled in the art as a standard water slurry process. In this process explosive crystals and passivated aluminum powder is washed in water and heated before a solution of a binder system is added. After such addition, the mixture is further heated to 100° C. such that the solvent is distilled whereby the binder is precipitated out and coats the particles of explosive and aluminum, and binds these together into granulated particles. The distilled solvent is directly recycled after separation from water. The granulates of the coated product are isolated by filtering. It is surprising for one skilled in the art that such aluminum-containing compositions, in a safe manner, can be produced in such a water slurry process with temperatures up to 100° C. since it is a safety risk to mix aluminum powder with water at such high temperatures. According to the article that Stephen. L. Jones et al. presented in Florida in March 2003, persons skilled in the art taught that it was not possible to produce aluminum-containing compositions in a standard water slurry process because of the safety risk. Stephen. M. Nicolich et al. presented at the same symposium that because of safety reasons it was not possible to use a water slurry process with temperatures over 30° C. when producing aluminum-containing explosive compositions.

[0021] Compared to the prior art, the present invention provides clear advantages in that the compositions can be produced in a water slurry process. A water slurry process provides the advantage over a mechanical dry mixing of a composition with explosive and aluminum powder of providing a much more homogenous granulate where aluminum and the explosive are evenly disbursed in each corn. This is important for one skilled in the art since an even, homogenous dispersion of explosive, aluminum and binder is essential in the finished charges since they would otherwise not have consistent performance in terms of safety and yield.

[0022] Compared to the prior art, the present invention has the advantage that the raw material crystals can be moist before their use in the process. One skilled in the art will appreciate the clear logistic and safety advantages since the explosive crystals can be produced, stored and transported in a moist state. With a kneading process, such as described by Joseph Turci et al. (U.S. Pat. No. 5,472,531) it is known by one skilled in the art that dry crystals must be used. Handling large quantities of dry RDX and HMX crystals is known to one skilled in the art to be associated with higher risk than handling such crystals in a moist state. At the same time, one is relieved from the need to dry the crystals, which one skilled in the art knows to be an economic advantage since it does not require the use of drying equipment, energy and drying time.

[0023] The present invention, as opposed to the prior art allows the production of aluminum-containing compositions in a standard water slurry process by removing the solvent by distillation by heating up to 100° C., such that the binder that is precipitated binds together the explosive and the

aluminum. In the process that was presented, by Nicolich et al. it is not possible to exceed 30° C. when aluminum is present with water. How the binder is precipitated is not described by Nicolich.

[0024] The present invention, as opposed to the prior art, allows the production of aluminum-containing compositions in a standard water slurry process using aluminum that is passivated with isostearic acid as opposed to the much more environment-unfriendly and health-damaging and more expensive aluminum that is passivated by bichromation such as described in the French patent (FR 2 031 677). The term passivated means that the aluminum is coated with a material/composition that actively hinders the reaction of aluminum with water under the conditions that exist in a water slurry process for the production of an explosive. This effect can be achieved by a coating that physically prevents water from coming in contact with the aluminum, a coating that has an inhibiting effect on the reaction between water and aluminum, or a combination of these. It is preferred that the coating is created by materials/compositions that have relatively little damaging effect on the environment beyond the explosive's intended explosive effect, that is to say, it should not leave poisonous residues that can enter the environment. The invention should therefore not be understood to be limited to the preferred coating of isostearic acid, in that one skilled in the art will understand that other types of wax or binders will have the same, or approximately the same effect as the preferred isostearic acid.

[0025] One skilled in the art could arrive at similar compositions within the scope the present invention by using other crystalline explosives than RDX or HMX, such as for example 2,4,6,8,10,12-hexanitro-2,4,6,8,10,12-hexaazaisowurtzitane (CL20), 2,2',4,4',6,6'-hexanitrotransstilben (HNS), 1,3,5-triamino-2,4,6-trinitrobenzene (TATB) and 3-nitro-1,2,4-triazole-5-one (NTO). Similarly, one skilled in the art could arrive at similar compositions within the scope the present invention by using other elastomers, such as for example styrene-butadiene or styrene-isoprene copolymer which are available from among other sources Kraton polymers. Other examples are europren and cyanacryl (trademarks from EniChem), Krynac (trademark from Bayer polymers), Nipol (trademark from Zeon chemicals) and Noxite (trademark from Nippon Mektron). In recent years, energy-rich elastomers have been investigated for use in explosive compositions however none of these are commercially available today. The use of such energy-rich elastomers for compositions may also possibly be used in explosive compositions within the scope of the invention. In the present invention, HyTemp 4454 has been chosen because it has been used for years in the explosives industry for pressable compositions and for the known characteristic that HyTemp 4454 results in compositions with excellent characteristics for use in low-sensitivity ammunition. HyTemp is also known to have good compatibility with explosives, something that is very important for this type of composition.

[0026] One skilled in the art could arrive at similar compositions within the scope of the present invention by using other softeners. In addition to dioctyl adipate (DOA), softeners such as Dioctyl sebacate (DOS) and Isodecyl pelargonate (IDP) are also used together with HyTemp in explosive compositions (Amy J. Didion and K. Wayne Reeds 2001 Insensitive Mutation and Energetic Materials Technology Symposium, Bordeaux, proceedings page 239). Other

known softeners used in the explosives industry are for example Dioctyl maleate (DOM), Dioctyl phthalate (DOP), Glycidyl acid polymer (GAP), BDNPA/F (1:1 mixture of Bis(2,2-dinitropropyl)acetal and Bis(2,2-dinitropropyl)formal) and N-alkyl-Nitrato Ethyl Nitramine (Alkyl-NENA). These softeners and other similar softeners can function adequately in the present invention. Dioctyl adipat (DOA) has been chosen in the present invention because it is the most commonly used together with HyTemp in explosive compositions. Dioctyl adipat (DOA) is also known to have good compatibility with explosives and binders.

[0027] In the present invention. HyTemp 4454 and DOA are used as the binder because this binder mixture is known to one skilled in the art to provide pressable explosive compositions with good characteristics for use with low-sensitivity ammunition. Earlier, HyTemp 4054 and HyCar 4054 were used, which are the same polymer as HyTemp 4454, but which are delivered in larger clumps compared to HyTemp 4454.

DETAILED DESCRIPTION OF THE INVENTION

[0028] A further description of the invention will be aided by examples. These examples are only meant to illustrate the preferred embodiments, and should not be taken as limiting for the more general inventive concept of producing aluminum-containing explosive compounds by a water slurry process.

[0029] In the following examples, passivated aluminum is defined as passivated with 0.3% by weight isostearic acid.

EXAMPLE 1

[0030] In a 1.50 l reactor, 13.05 kg of HMX was washed in approximately 50 l water under stirring. The mixture was heated up to approximately 60° C. and 0.75 kilograms of passivated aluminum was added to this mixture. Thereafter an ethyl acetate solution of 0.3 kg HyTemp 4454 and 0.9 kg DOA was added in a thin stream. Thereafter the solution was further heated to 100° C. under distillation of the ethyl acetate-water azeotrope. The mixture was cooled and run through a filter where the product (approximately 1.5 kg) was filtered out.

[0031] The product is a granulate, and investigation in an optical microscope reveals that the aluminum and the explosive are homogeneously disbursed in each granule. Composition analysis shows that the product contains 87.1% by weight HMX, 5.5% by weight DOA, 2.3% by weight HyTemp and 5.1% by weight aluminum.

EXAMPLE 2

[0032] The same procedure was used as described in example 1, but the amounts that are used were as follows: 12.3 kg HMX, 1.5 kg passivating aluminum, 0.3 kg HyTemp 4454 and 0.9 kg DOA.

[0033] The product is a granulate, and investigation in an optical microscope reveals that the aluminum and the explosive are homogeneously disbursed in each granule. Composition analysis shows that the product contains 83.3% by weight HMX, 5.6% by weight DOA, 1.8% by weight HyTemp and 9.3% by weight aluminum.

EXAMPLE 3

[0034] The same procedure was used as described in example 1, but the amounts that are used were as follows: 10.06 kg HMX, 3.75 kg passivated aluminum, 0.3 kg HyTemp 4454 and 0.9 kg DOA.

[0035] The product is a granulate, and investigation in an optical microscope reveals that the aluminum and the explosive are homogeneously disbursed in each granule. Composition analysis shows that the product contains 66.6% by weight HMX, 5.7% by weight DOA, 1.8% by weight HyTemp and 25.9% by weight aluminum.

EXAMPLE 4

[0036] The same procedure was used as described in example 1, but the amounts that are used were as follows: 9.3 kg HMX, 4.5 kg passivated aluminum, 0.3 kg HyTemp 4454 and 0.9 kg DOA.

[0037] The product is a granulate, and investigation in an optical microscope reveals that the aluminum and the explosive are homogeneously disbursed in each granule. Composition analysis shows that the product contains 63.2% by weight HMX, 5.5% by weight DOA, 1.7% by weight HyTemp and 29.6% by weight aluminum.

EXAMPLE 5

[0038] The same procedure was used as described in example 1, but the amounts that are used were as follows: 6.3 kg HMX, 7.5 kg passivated aluminum, 0.3 kg HyTemp 4454 and 0.9 kg DOA.

[0039] The product is a granulate, and investigation in an optical microscope reveals that the aluminum and the explosive are homogeneously disbursed in each granule. Composition analysis shows that the product contains 43.4% by weight HMX, 5.5% by weight DOA, 1.9% by weight HyTemp and 49.3% by weight aluminum.

EXAMPLE 6

[0040] In a 150 l reactor, 9.6 kg RDX was washed in approximately 50 l water under stirring. The mixture was heated to approximately 60° C. and 4.5 kg passivated aluminum was added to the mixture. Thereafter an ethyl acetate solution of 0.225 kg HyTemp 4454 and 0.675 kg DOA was added in a thin stream. Thereafter the mixture was further heated to 100° C. under distillation of the ethyl acetate-water azeotrope. The mixture was cooled and run through a filter where the product (approximately 1.5 kg) was filtered out.

[0041] The product is a granulate, and investigation in an optical microscope reveals that the aluminum and the explosive are homogeneously disbursed in each granule. Composition analysis shows that the product contains 63.5% by weight RDX, 4.4% by weight DOA, 1.4% by weight HyTemp and 30.7% by weight aluminum.

EXAMPLE 7

[0042] In a 1.50 l reactor, 9.0 kg RDX and 1.5 kg HMX was washed in approximately 50 l water under stirring. The mixture was heated to approximately 60° C. and 3 kg passivated aluminum was added to the mixture. Thereafter an ethyl acetate solution of 0.375 kg HyTemp 4454 and

1.125 kg DOA was added in a thin stream. Thereafter the mixture was further heated to 100° C. under distillation of the ethyl acetate-water azeotrope. The mixture was cooled and run through a filter where the product (approximately 15 kg) was filtered out.

[0043] The product is a granulate, and investigation in an optical microscope reveals that the aluminum and the explosive are homogeneously disbursed in each granule. Composition analysis shows that the product contains 59.4% by weight RDX, 10.8% by weight HMX, 7.1% by weight DOA, 2.3% by weight HyTemp and 20.4% by weight aluminum.

EXAMPLE 8

[0044] The same procedure is in example 7, but where the amount of RDX and HMX were respectively 6.0 kg and 4.5 kg.

[0045] The product is a granulate, and investigation in an optical microscope reveals that the aluminum and the explosive are homogeneously disbursed in each granule. Composition analysis shows that the product contains 38.6% by weight RDX, 32.4% by weight HMX, 6.9% by weight DOA, 2.3% by weight HyTemp and 19.8% by weight aluminum.

[0046] The examples that are presented show that a water slurry process functions very well for a wide range of aluminum content. In examples one through five, the content of aluminum varies from 5% by weight through 50% by weight aluminum. Example 6 shows that the process also functions when HMX is substituted with RDX. Example 7-8 show that it is possible to produce granules with a mixture of RDX and HMX in differing percentages together with aluminum.

1. A pressable explosive composition having increased explosive pressure, characterized in that;

it comprises between 45 and 95% by weight explosive crystals and between 5 and 55% by weight passivated aluminum powder, and

a binder that is chosen such that the mixture satisfies the requirements for low-sensitivity explosives (IM requirements).

2. The explosive composition according to claim 1, characterized in that the explosive crystals are HMX or RDX.

3. The explosive composition according to either claim 1 or 2, characterized in that the aluminum is passivated by being coated with a coating that prevents the aluminum powder from reacting with water.

4. The explosive composition according to claim 3, characterized in that the coating is a wax.

5. The explosive composition according to claim 3, characterized in that the coating is isostearic acid.

6. The explosive composition according to any of claims 1-5, characterized in that the amount of binder in the composition is between 2% by weight and 15% by weight.

7. The explosive composition according to any of claims 1-5, characterized in that the binder comprises a polyacrylic elastomer, preferably HyTemp 4454 or HyTemp 4054.

8. The explosive composition according to either of claims 6 or 7, characterized in that a softener is added to the composition.

9. The explosive composition according to claim 8, characterized in that the softener is chosen from the group consisting of Dioctyl adiapt (DOA), Dioctyl sebacat (DOS), isodecyl pelargonate (IDP), dioctyl maleate (DOM), and dioctyl phthalate (DOP).

10. The explosive composition according to claim 9, characterized in that the binder comprises HyTemp 4454 or HyTemp 4054 with Dioctyl adipat as the softener.

11. A method for producing a pressable explosive composition having low-sensitivity, such composition comprising;

between 45 and 95% by weight explosive crystals,

between 5 and 55% by weight passivated aluminum powder,

a binder that is chosen such that the mixture satisfies the requirements for low-sensitivity explosives (IM requirements), and possibly also

a softener,

the method characterized by comprising the steps of;

the aluminum is first passivated by being coated by a coating that prevents its reaction with water,

thereafter the explosive crystals and the aluminum are washed in water and heated,

thereafter is added a solution of the binder and possibly also the softener, and

the mixture is thereafter heated to a temperature that results in the solvent being distilled out of the composition.

12. The method according to claim 11, characterized in that the explosive crystals are RDX or HMX.

13. The method according to either of claims 11 or 12, characterized in that the amount of the binder in the composition is between 2% by weight and 15% by weight.

14. The method according to claim 13, characterized in that the binder is a polyacrylic elastomer, preferably HyTemp 4454 or HyTemp 4054.

15. The method according to either claim 13 or 14, characterized in that a softener is added to the composition.

16. The method according to claim 15, characterized in that the softener is chosen from the group consisting of Dioctyl adiapt (DOA), Dioctyl sebacat (DOS), isodecyl pelargonate (IDP), dioctyl maleate (DOA), and dioctyl phthalate (DOP).

17. The method according to claim 13, characterized in that the binder comprises HyTemp 4454 or HyTemp 454 with Dioctyl adipat as the softener.

18. The method according to any of claims 11-17, characterized in that the passivating coating is a wax.

19. The method according to claim 18, characterized in that the passivating coating is isostearic acid.

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