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LOW LIGHT LEVEL TRACER MIX

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ABSTRACT OF THE DISCLOSURE

A low light level, long-burning, small arms tracer pyrotechnic mixture for use with night vision equipment comprising, by weight percent: strontium peroxide, 10–90; barium perioxide, 0–65; calcium resinate, 5–15; and magnesium carbonate, 10–15.

This invention may be manufactured, used, and licensed by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to pyrotechnics and more particularly concerns low light level tracer mixtures for small arms ammunition.

An object of the invention is to provide improved tracer mixtures for small arms ammunition.

Another object of the invention is to provide tracer mixtures providing a low light emission in the visible portion of the spectrum and a high light emission in the infrared spectral region.

Other objects and advantages of the invention will be apparent as the description of the invention proceeds.

In accordance with the above objects, the components of my mixtures in the form of homogeneous powders, will have sizes smaller than about 60 mesh, and will be pressed into a tracer cavity of a projectile at normal consolidating pressures for standard tracer mixtures, or about 100,000 p.s.i.

My tracer mixtures will be used most advantageously with small arms ammunition, up to and including about 20 mm. ammunition. When ignited, my mixtures cannot be seen or detected with the unaided eye even under conditions of extreme darkness. With the aid of night vision devices, however, such as the Starlight scope, low light level T.V., forward looking IR devices, or any suitable image intensifying devices, light emission of the tracer projectile using my mixtures may readily be observed to a trace length in excess of about 1200 yards.

Present tracer mixtures emit an undesirably high level of light intensity when burned causing night vision devices to malfunction and/or the gunner to lose sight of the target.

My protechnic mixtures include the following components by weight:

	Percent
Strontium peroxide	10–95
Barium peroxide	10–65
Calcium resinate	5–15
Magnesium carbonate	10–15

The peroxides function as oxidizing agents. Barium peroxide yields substantially no ash upon combustion where-

as strontium peroxide does. In order to ballistically match ball and tracer rounds, it may be desirable to combine these peroxides. The barium peroxide, however, may be excluded from my compositions altogether if a ballistic match between ball and tracer rounds is not needed.

Calcium resinate functions as the fuel/binder and should desirably be present in amounts ranging between about 5 to 15 weight percent of the final tracer mix. Amounts substantially below or above these values cause poor and erratic performance of the tracer mix.

The magnesium carbonate is a burning rate modifier and flame retardant. When approximately 15 weight percent of this compound is used in my tracer mixes, as compared to its non-inclusion, the combustion thereof is not only slower, but the light emission is reduced even further. It must be remembered that my compositions are low light level emitting compositions even without the addition of any magnesium carbonate.

A preferred long-burning tracer mix which exhibits low light level emission in the visible spectrum and high light level emission in the infrared spectrum is:

EXAMPLE I

	Percent Wt.
Strontium peroxide	40
Barium peroxide	40
Calcium resinate	10
Magnesium carbonate	10

Other examples are:

EXAMPLE II

	Percent Wt.
Strontium peroxide	81
Calcium resinate	9
Magnesium carbonate	10

EXAMPLE III

	Percent Wt.
Strontium peroxide	37.5
Barium peroxide	37.5
Calcium resinate	10.0
Magnesium carbonate	15.0

The mixture of Ex. II will produce a greater quantity of ash and burn slightly faster than the mixtures of the other two examples. Strontium peroxide yields ash and burns faster than barium peroxide. Similarly, the mixture of Ex. I will burn faster than the mixture of Ex. III and will yield a slightly higher light level, both in the visible and IR spectral regions.

I claim:

1. A long-burning tracer pyrotechnic mixture having a low light emission in the visible portion of the spectrum and a high light emission in the infrared spectral region, said mixture comprising 10 to 95% by weight of strontium peroxide, 0 to 65% by weight of barium peroxide, 5 to 15% by weight calcium resinate, and 10 to 15% by weight of magnesium carbonate.

2. The mixture of claim 1 wherein said peroxides each comprise about 40 weight percent, and said resinate and said carbonate each comprise about 10 weight percent.

3. The mixture of claim 1 further characterized by said strontium peroxide being present in an amount of about 81 weight percent, said calcium resinate being present in an amount of about 9 weight percent, and said magnesium carbonate being present in an amount of about 10 weight percent.

4. The mixture as described in claim 1 wherein said strontium peroxide and said barium peroxide each constitute about 37.5 weight percent, the balance consisting essentially of said calcium resinate and said magnesium carbonate in a weight ratio respectively of about 2 to 3.

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