

WASC 2230

History of Explosives
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LYNNE

WITH LOVE

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BLACK POWDER (GUN POWDER)

FIRST MADE: Around 1000 AD by the Chinese.

INGREDIENTS: Potassium Nitrate 75%
(Salt Peter)
Charcoal 15%
Sulphur 10%

METHOD OF MANUFACTURE: The ingredients are mixed together with a little water to give a "green charge". This was usually at least 60%. The "green charge" was then intimately blended in an incorporating (edge-runner) mill. The incorporation process lasted at least 6 hours and the product was called "mill cake".

Next the "mill cake" is broken up using mallets, sieves or machines. The resulting product is "meal powder". This is now pressed in either screw or hydraulic presses to form "press cake". The object of this process is to make the product more dense.

The "press cake" is now broken down into chunks by machine. These ^{chunks} ~~are~~ are now granulated or "corned" using mechanical sieves to give grains of different graded sizes for different applications. The smaller grains are used for small weapons such as muskets and the larger ones for Canon. A sieve or revolving "heel" is used to "dust" the grains to remove any very fine dust which is recycled.

~~Lastly~~ The grains are tumbled in rotating drums with a little graphite. This makes the grains spherical and "glazes" them which reduces their tendency to absorb moisture from the air. Finally the grains are dried in stoves at 40°C until the moisture content is below 1%.

USE: It was used from 1000 AD up until the present time. Black Powder mainly fell from favour with the military around 1900 when Cordite and modern explosives were introduced into service use. It was the main propellant for small arms and canon, and the main explosive for all uses for hundreds of years. Its main disadvantages were: (a) its extreme sensitiveness to accidental ignition (especially when mixed with grit), (b) the ease with which it absorbs moisture from the air and (c) the large amount of smoke produced when it was fired. This gave away the position of the firer and could also obscure the target.

Black powder is still used today in some special military applications, such as igniter bags for gun propellant charges. It is still extensively used in the manufacture of fireworks.

CORDITE

FIRST MADE: Patented in 1889 by the British Government.

INGREDIENTS: Nitroglycerine
 Nitrocellulose
 Picrite - used after WWI for gun
 (Nitroguanidine) Propellants
 Stabilisers and additives

METHOD OF MANUFACTURE: The main ingredients, the nitrocellulose and nitroglycerine, are mixed together under water. Sometimes some of the minor ingredients are added at this stage. Most of the water is removed on a paper making table. The resulting wet "paste" is either dried in a stream of warm air, if intended for gun propellant, or mixed with other ingredients before being dried in the same way, if it is intended for rocket propellant.

For gun propellants the dried paste was mixed or "incorporated" with solvents and other additives to form a dough. This was loaded into a press and extruded through dies into cords or other shapes. ^{These were heated to remove the solvent.}

For rocket propellants the dried paste was ~~rolled~~ formed into sheets by passing it ~~through~~ between hot rollers. Discs were cut from the sheets, loaded into a hot press and extruded through dies into tubes or other shapes.

It is surprising ~~to~~ that two of the most sensitive secondary explosives known, nitrocellulose and nitroglycerine,

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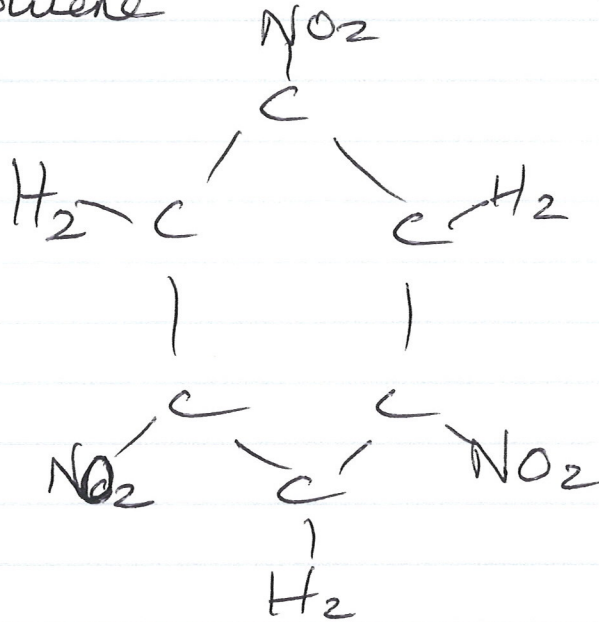
should combine to give a relatively safe product but it's the case.

USE: Cordite was used from around 1900 to the present day. It is mainly used as a propellant for large guns and in small rockets when the absence of smoke is important. Cordite is often referred to as smokeless ~~it~~ and it is virtually so. It is a more powerful propellant than black powder and is much less easily ignited accidentally. Also it does not absorb moisture from the air.

6 TNT

FIRST MADE: Around 1900 by the Germans.

INGREDIENTS: a single compound
trinitro toluene



METHOD OF MANUFACTURE: Trinitro toluene is made in a continuous process by the nitration of toluene using mixed nitric and Sulphuric Acids.

USE: It has been used from around 1900 to the present day. Although not often used on its own ~~alone~~ today it is frequently used in a mixture with RDX which it desensitizes. It is cheap and relatively insensitive. It is more powerful than black powder but not as powerful as RDX.

Tetryl (CE)

FIRST MADE: Around 1900.

INGREDIENTS: A single compound
N-methyl 1,2,4,6-tetra nitro-N-nitroaniline

METHOD OF MANUFACTURE: Tetryl is made in a continuous process by the nitration of N,N-dimethylaniline with mixed Nitric and Sulphuric Acids

^{It was used}
USE: From around 1900 to the present day. Tetryl is an "intermediary" explosive. It is used to "boost" the explosion from a fuse to set off the main explosives charge. The main charge will be a ~~relatively~~ relatively insensitive secondary explosive. Tetryl has been superseded to some extent by more modern intermediaries ~~and~~ such as PETN but is still in large scale use. It is quite poisonous ~~to~~ and workers have to take strict precautions when handling it or they would turn yellow. Women who worked in munitions factories with tetryl during WWI and were so affected were called "canaries".