

RDX

During the First World War or the "Great War" as it was known to the generation that fought it the supply of High Explosives became a bottleneck of such magnitude that two important steps were taken:

The Amatols were introduced to conserve stocks of TNT.

Research was commenced to find an explosive that could be manufactured from readily available raw materials.

The Amatols are still with us and due to that early WWII research we have two very powerful explosives.

PETN (Pentaerythritol-Tetranitrate)

RDX which has a variety of names.
Research Department Formula X
Cyclonite
Hexogen T-4
Cyclotrimethylenetrinitramine

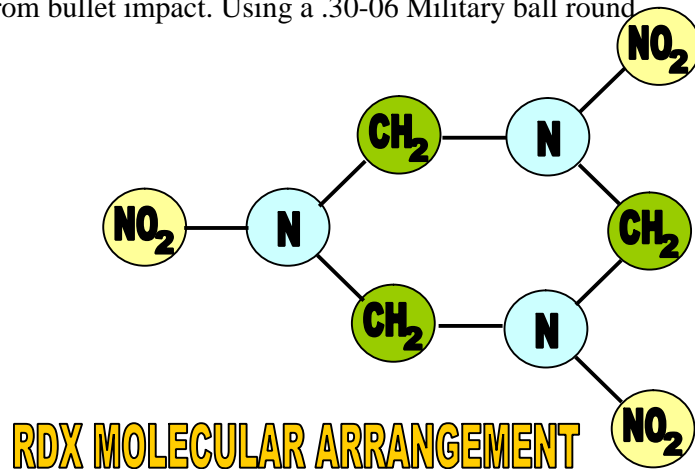
RDX is just about the standard High Explosive in use today. It was selected because of several good reasons.

Its manufacture requires only Coal, Water and Air and it requires only water to purify it. It is slightly less sensitive than PETN.

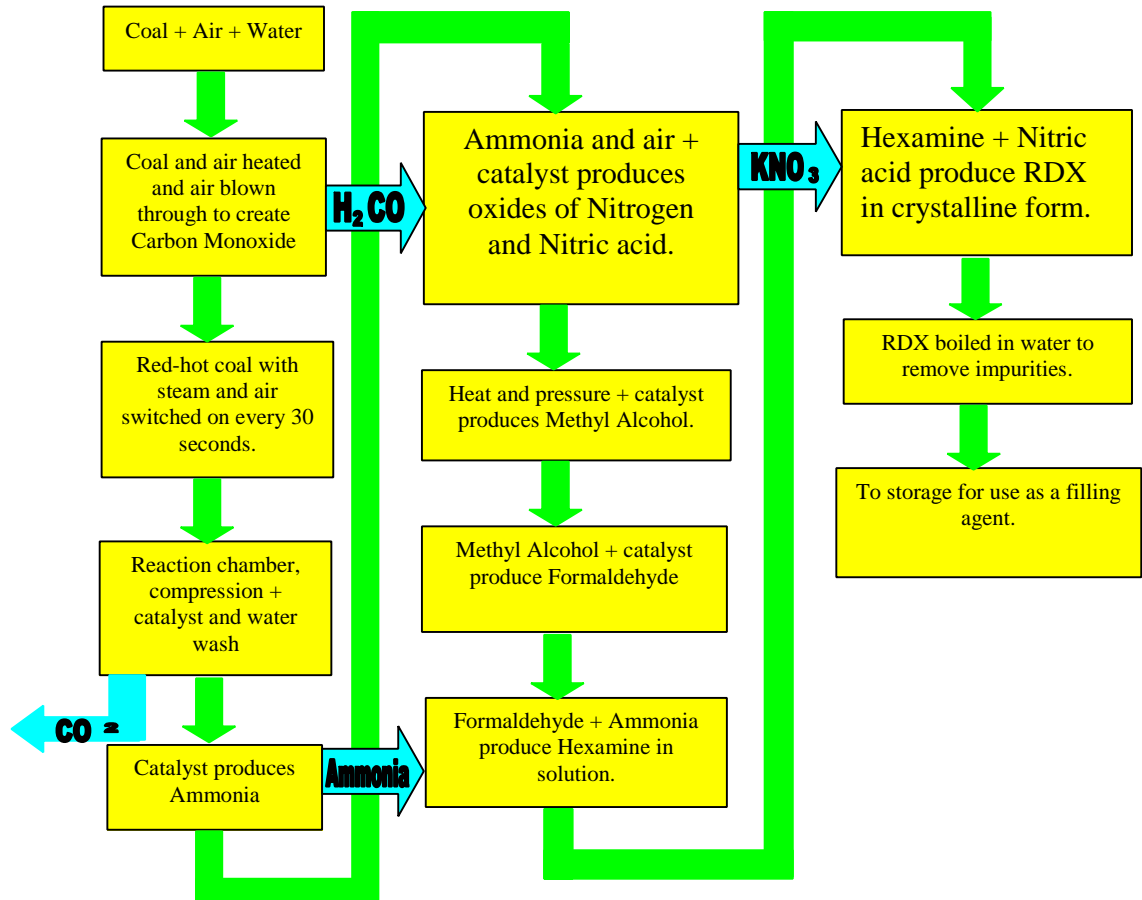
The physical properties of RDX.

FORMULA	MP	IP	Power	F of I	V of D	Density
$[\text{CH}_2\text{N}(\text{NO}_2)]_3$	204°C	210°	170	80	8400 m/sec	1.82

RDX is a white crystalline solid that is not hygroscopic. It is very stable and is reasonably inexpensive to produce. The major failing of RDX is that it is too sensitive to use alone as a main filling so must be mixed with other substances. TNT is one of these substances but wax is probably the most common agent used as a desensitiser. The sensitivity of RDX is such that it will explode 100% from bullet impact. Using a .30-06 Military ball round



THE PRODUCTION OF RDX



A Summary of the Manufacturing process.

Coal is placed in a retort and fired and air is blown through to convert the coal to CO (carbon Monoxide)

When the coal is very hot the air is turned off and steam is turned on. The steam is then turned off and the air is turned back on. This process is repeated every 30 seconds (some of the H₂ and CO is bled off for later use at stage 6.)

The resulting gasses from stage one and two are mixed in a reaction chamber and compressed to 50 atmospheres and passed through an iron catalyst. Any CO₂ remaining is removed by passing the mixture through water. The mixture is passed over a catalyst which produces NH₃ (Ammonia) some of which is bled off for use later at stage 8.

Ammonia and air are passed through a catalyst. The resulting mixture plus H₂ and CO is heated (480 C) and pressurized (250 atmospheres) and passed through a catalyst which produces Methyl Alcohol. This Methyl Alcohol plus air is passed through a catalyst to produce Formaldehyde in solution.

The Formaldehyde is mixed with the Ammonia from stage 4 which results in the formation of Hexamine plus water.

This Hexamine is treated with nitric acid and heated and cooled at the same time. This results in RDX precipitating out as a crystal.

The crude RDX is diluted with water and boiled to remove impurities and, as there are approximately 50 by-products, the yield is usually about 70% of the theoretical.



Plastic Explosive No. 4
88% RDX
11% Plasticizer
1% Penta erythritol diolate