

TRINITROTOLUENE

Mr. J. Willbrand discovered this explosive in 1863 but it was not until the Great War that large-scale production and use occurred. It is one of the most used and popular explosives in the world today. The German military system began using this explosive in 1902. Early complications with this explosive were concerned with the difficulty in getting complete detonation because the original exploder systems were inadequate. The difficulty in getting it to detonate is a good indication of the stability of the explosive. It is the presence of the impurity DNT which makes the detonation difficult because it reduces the melting point. It is very safe to handle and use. It is a true Nitro-compound and it is poisonous. To economize on the usage of TNT during WWI, Ammonium Nitrate and Barium Nitrate were mixed with TNT thus producing the Amatols and Baratols.

This explosive is almost insoluble in water but readily soluble in Acetone and ethyl acetate.

National names for this explosive are.

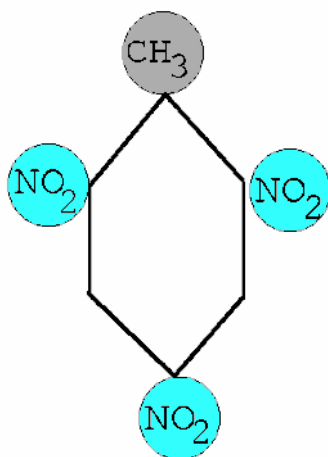
British = Trotyl

French = Tolute

German = Sprengmunition-02

The physical properties of TNT.

FORMULA	MELTING POINT	IGNITION POINT	POWER (Lead block)	F of I	V of D	Density
$C_6H_2(NO_2)_3(CH_3)$	81 to 82°	240°	95	115	6950 mps	1.56



MOLECULAR ARRANGEMENT

TNT is produced in three grades based on the melting point and these are:

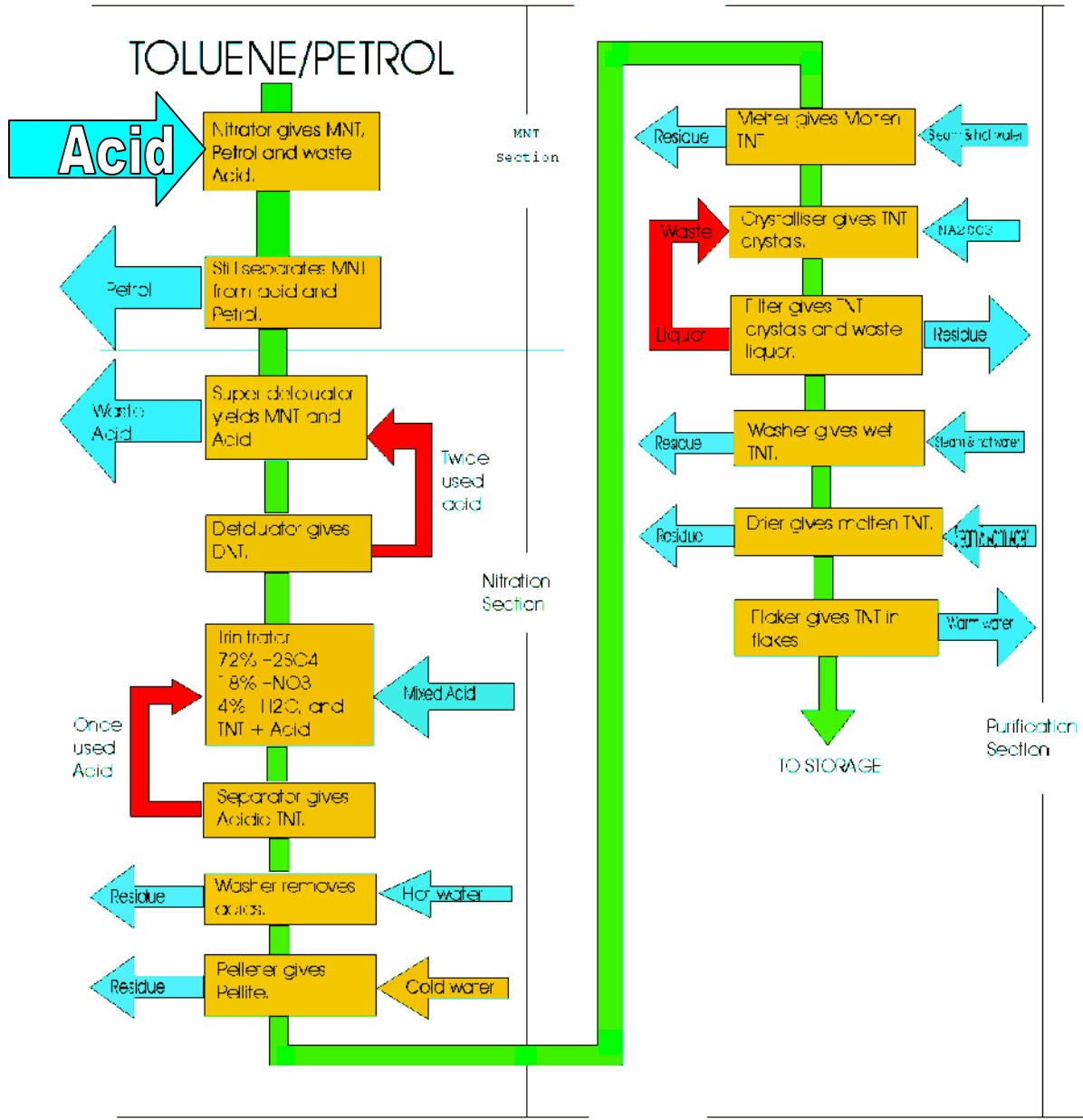
Grade 1 80° to 80.7°

Grade 2 79.5° to 80.7°

Grade 3 76° to 80.7°

Good quality TNT is a whitish to yellowish colour.

THE PRODUCTION OF TRINITROTOLUENE



A SUMMARY OF THE PROCESS

A mixture of Toluene and Benzene is placed in a Nitrator and treated with a mixture of

62% Sulphuric Acid (H_2SO_4)

21% Nitric Acid (KNO_3)

17% water.

This action converts the Toluene to Mononitrotoluene (MNT). The remaining benzene is unaffected by the acids and is saved for re-use. This is achieved by recovering the benzene in a still.

The MNT is passed to a super detoluator which recovers any remaining traces of Nitrated Toluene. This action also separates any remaining acid traces. The product of this treatment is an acidic MNT.

The acidic MNT is passed to a detoluator and further recovery of Nitrated Toluene and acids is carried out. The recovered acids from this section are passed to the superdetoluator for reuse. The product of this section is Dinitrotoluene (DNT).

The DNT is passed to a Nitrator where it is once again treated with a mixture of

78% Sulphuric Acid

18% Nitric Acid

4% water.

This treatment yields a mixture of TNT and acids.

This mixture of TNT and acids is passed through a separator which removes as much acid as possible. This recovered acid is passed back to the detoluator for use again. The product of this section is an acidic TNT in a molten state.

The molten TNT is passed to a washer where it is washed with hot water. The residue from this washing is run to waste.

The TNT is passed into the "Pelleter" where the molten TNT is met by a jet of cold water which solidifies the TNT into small pellets. In this form it is known as "Pellite"

The Pellite is passed to a melter where it is melted by the action of steam and hot water. This action provides an additional washing.

The molten TNT is passed to a "Crystalliser" where it is washed with a solution of Sodium Sulphide (Na_2SO_3) and waste liquor from the next operation and cooled.

The TNT crystals and liquor are passed through a filter and the waste liquor recovered and passed back to the crystalliser for reuse. The TNT crystals are passed on to a washer. In this washer the TNT crystals are treated with steam and hot water. The product of this section is wet TNT.

The wet TNT is dried by the action of steam and warm water and is melted once again.

The molten TNT is passed to a trough with a steam jacket. In this trough and partially immersed in the molten TNT is a drum with an internal cooling system. Inside the drum is a scraper. As the drum revolves it picks up molten TNT and, because of the cooling system, the TNT solidifies and the scraper removes the solidified flakes and they fall down a chute to the packing room underneath.

Compounds formed during the manufacturing process and sometimes remaining as impurities are the two unsymmetrical Nitro bodies DNT and MNT.