EXPLOSIVE

1. Introduction
2. Types of explosive
3. Characteristics of explosive
4. Preparation and uses of TNT,TNG and Nitrocellulose
5. Plastic explosive

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Introduction

- An explosive is a reactive substance that contains a great amount of potential energy that can produce an explosion.
- Usually accompanied by the production of heat , light , sound and pressure .
- The potential energy stored in an explosive may be chemical energy, pressurized gas, and nuclear energy.

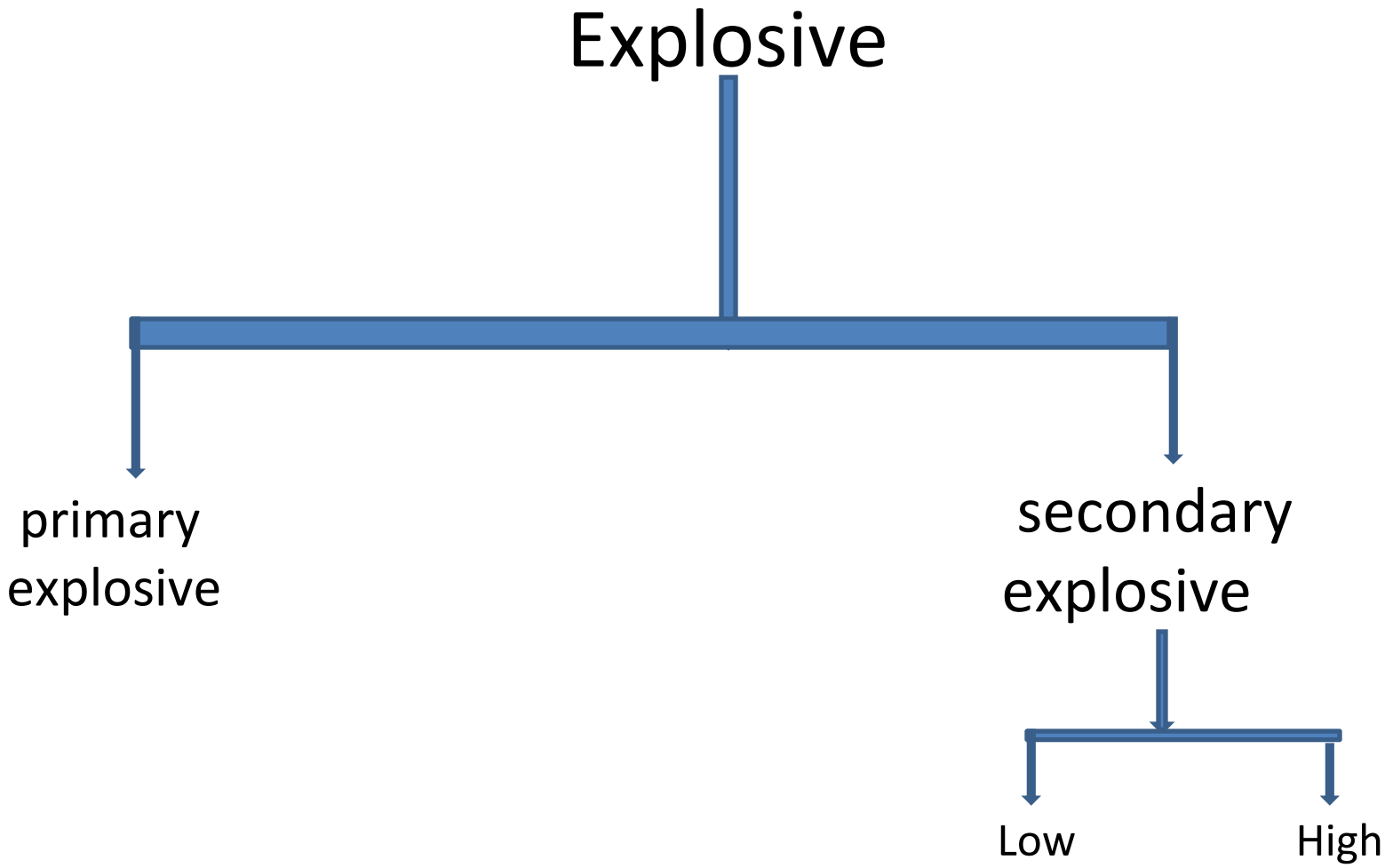
Introduction

- However , a system is said to be explosive when it undergoes chemical reaction to form gaseous product in a very short time which develop pressure and temperature with in the body of system.
- Explosive may be a single substance or a mixture of compound.
- Explosive are commonly associated with destruction which is used for defense purposes.

Application of Explosive

- Generation of significant amount of heat energy.
- Use for both constructive and destructive purpose.
- Blasting of ores for extraction of metals
- Drilling the holes in mountains for tunnel construction
- Quarrying stones for road building
- Making bombs, rockets, torpedoes and grenades for war defensing purpose
- Excavating earth for dam construction.

Types of explosive



Primary explosive

- Primary explosive is inert explosive.
- Used in small amount to initiate the explosion of high explosive.
- Very sensitive which explode on receiving slight shock or fire.
- Also called detonator or initiating explosive.
- For e.g. lead azide(PbN_6)

  Silver azide(AgN_3)

  Mercury Fulminate[$Hg(CNO)_2$]

Low explosive

- Less sensitive than primary explosive .
- Do not explode suddenly.
- Reaction is comparatively slow and time consuming.
- Mainly used to project projectile like Rocket and Missiles.
- For e.g. Gun powder(mixture of KNO_3, charcoal and Sulphur).

  Nitrocellulose(smokeless power) etc.
- Rate of explosion is slower than the speed of sound(sub sonic).

High explosive

- They are perfect explosive for blasting and excavating.
- Less sensitive towards spark, fire and mechanical shocks.
- Can produce large amount of energy.
- Requires small amount of primary explosive to explode.
- For e.g. Trinitrotoluene(TNT) ,Pentaerythritol trinitrate.(PETN)

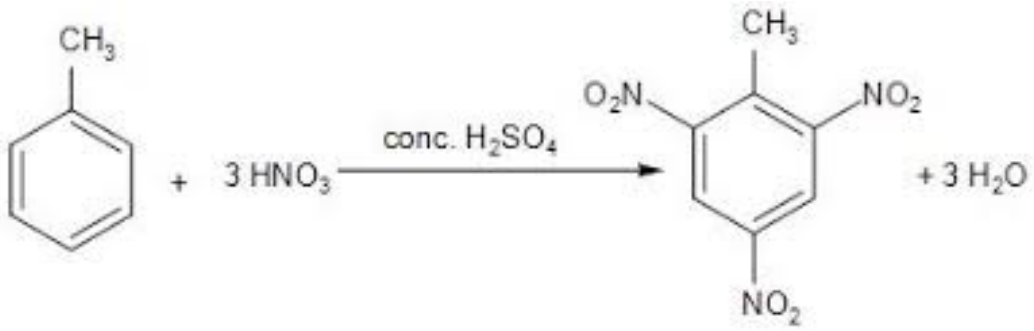
  Trinitro glyceride(TNG)
- Faster than the speed of sound(Supersonic speed) 3-9km/s

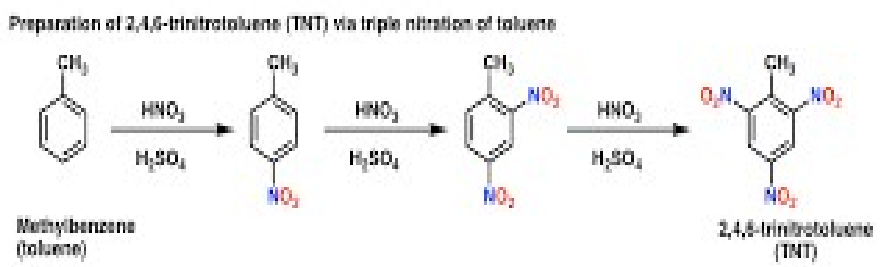
Characteristics of explosive

- Fast rate of decomposition to produce a large volume of gaseous product.
- Exothermic reaction.
- Cheap and stable under normal condition to store and transfer safely.
- Non volatile and non hygroscopic in nature.
- Positive oxygen balance.
- Having at least one weak bond like C-C, C-N,N-O, Cl-O etc.
- Highly sensitive towards detonator.

Preparation and application of TNT

- Trinitrotoluene is pale yellow crystalline solid.
- It is prepared by nitration of toluene in a special tank at 140c̊ then 180̊c and finally at 230̊c.





Application of TNT

- It is widely used in shell-firing and under-water explosion.
- It is used in military uses like making bombs , weapon and missiles etc.
- For blasting and excavating.

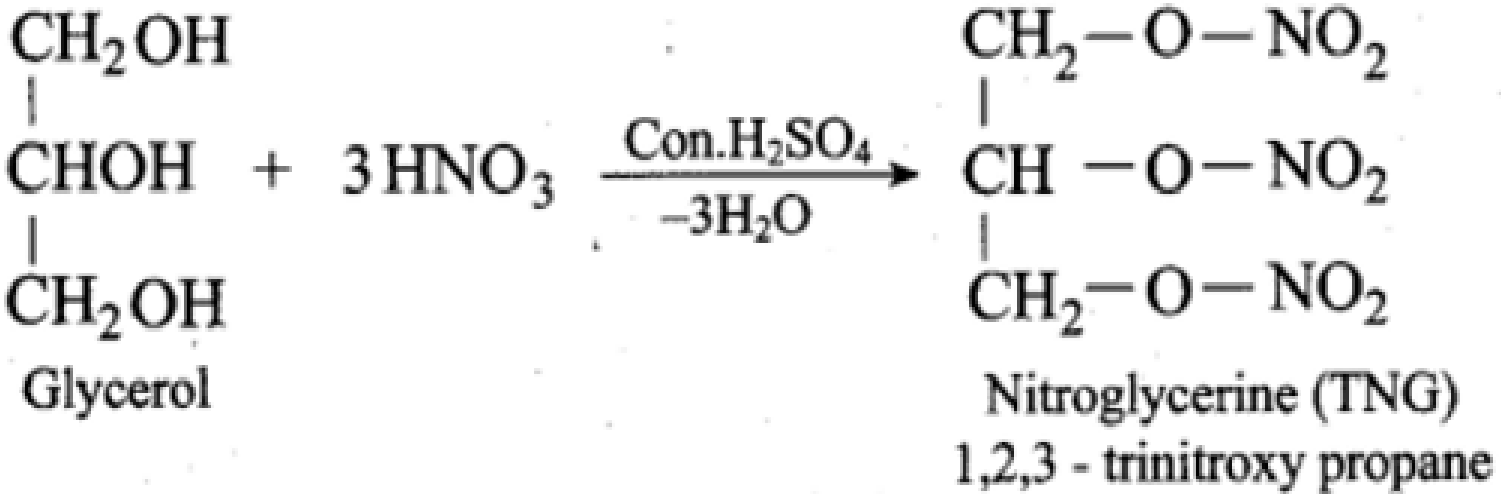
TNT bomb

TNT weapon

shell firing

Preparation and application of TNG

- It is prepared by nitration of glycerol at 25°c with constant stirring.

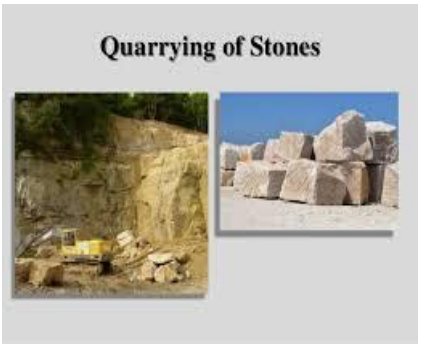


Glycerol

Nitroglycerine (TNG)
1,2,3 - trinitroxy propane

Application of TNG

- They are used to make Dynamites.
- Also used as military propellant for Gun and Rifles.
- Used in building destruction, railway tunnel formation , submarine blasting and quarrying stones.



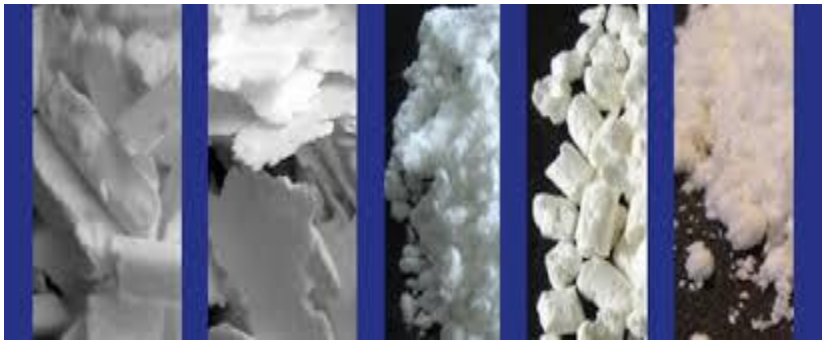
Nitrocellulose(gun cotton/cell-nitrate)

- It is prepared by nitration of cellulose at 25°c.
- $C_6H_7O_2(OH)_3 \longrightarrow C_6H_7O_2(O\text{-}NO_2)_3 + 3H_2O$

  Cellulose nitrocellulose

Uses:- 1. it is used in torpedoes(water missile) and submarine mines.

2. also used as propellant in rifle and heavy guns.



Plastic explosive

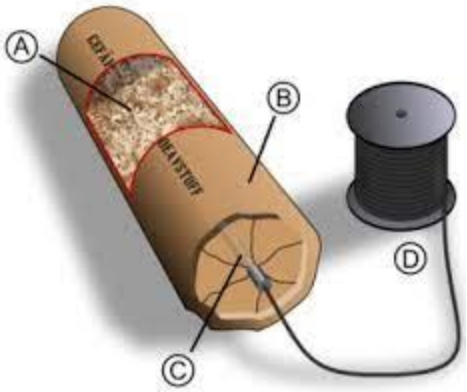
- Soft and hand moldable solid form of explosive material.
- They are combined form of explosive which are in polymer state.
- Mainly used for industrial applications and military purposes.
- May be molded into a sheet or putty like mass.
- Also called putty explosive
- For e.g. blasting gelatin, semtex etc

semtex

Gelatin stick

Dynamite

- It is high explosive containing nitroglycerine as the principal ingredient .
- Mainly used in mining, quarrying, construction and demolition industries.
- May be branched or straight dynamite.



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