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BCT A 04

Assignment 5

Explosives & Lubricants and Paints

1. What is explosive? Classify explosives with examples. What are the requirement of good explosives?

= Explosives are substances or mixtures than when ignited undergo a rapid, violent chemical reaction and produce a large amount of gas, heat, light, sound and high pressure.

Explosives are classified as:-

On the basis of their speed
1. High explosive (eg. TNT, TNG, RDX)
2. Low explosive (eg. gunpowder, nitrocellulose)

On the basis of their sensitivity
1. Primary explosives (eg. Lead azide, Tetracene)
2. Secondary explosives (eg. ammonium nitrate blasting agents, RDX, TNT)

The requiremets of good explosives are:-
- It must produce exothermic reaction along with gas, light, sound and high pressure.
- The explosion must be strong enough to blast ores, rocks in case of high explosives.
- The explosion must be strong enough to trigger other explosions in case of primary explosives.

2. What is lubricant? Write about the application of different types of lubricants. Write the characteristics of good lubricants.

= The substance applied between two moving or sliding surface to reduce frictional resistance between them is known as lubricants.

The application of various types of lubricants are:-

- Liquid lubricants are used as coolants, sealing agents.
- Liquid lubricants are used to prevent corrosion, to reduce the frictional force between two sliding surfaces.
- Semi-solid lubricants are used as friction remover for high bearing loads and shock loads.
- Solid lubricants are used for coating an insulating surface to make it conducting.

The characteristics of good lubricants are:-

- It must evenly spread on lubricating surface for uninterrupted motion.
- It must be resilient to high temperatures and high motions.
- It must last long on the surface.

3. Show your familiarity with primary and high explosives. Write the preparation and uses of TNT and TNG.

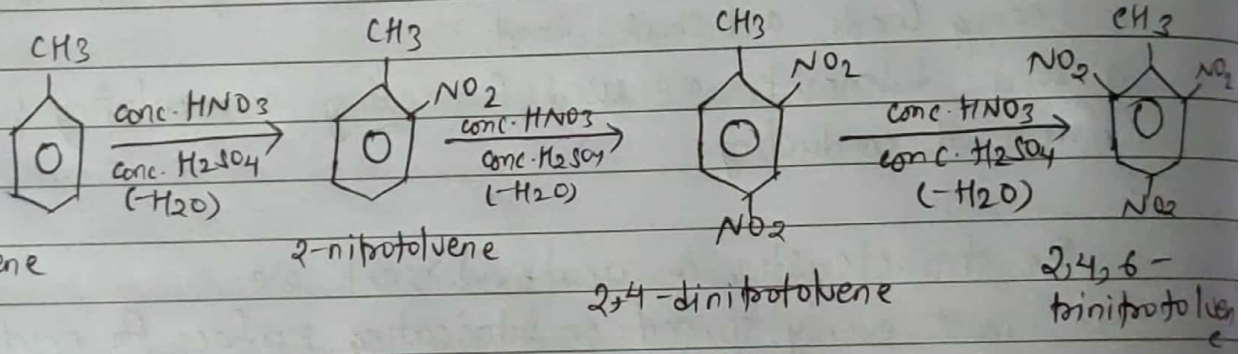
= Primary explosives are also called initiating explosives or detonators. They are very sensitive and explode on receiving slight shock / fire. They are mainly used in small quantities to start or initiate the explosion of the main explosive.

E.g. Lead azid (PbN_6), Tetracene ($C_2H_7N_7O$), etc.

High explosives are those explosives which have higher energy than other explosives. However, they are quite stable and less sensitive to fire and mechanical shock. They are mostly used for blasting, terror attacks, excavating, etc.

a) TNT

= It stands for trinitrotoluene. It is the principal military explosive. It is economic & safe, to prepare, has low sensitivity to impact, high stability, etc. It can be prepared by nitration of toluene with conc. HNO_3 and conc. H_2SO_4 at 140°c, then 180°c and finally at 230°c

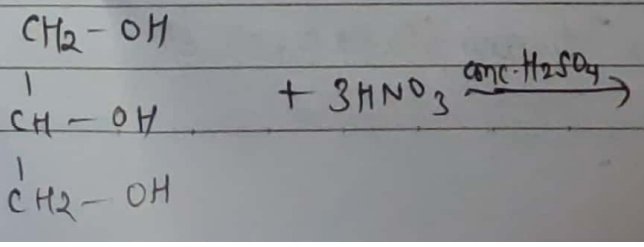


Uses

- It is used for the shell of a rocket launcher.
- It is used in air bond demolition.
- It is used in rock blasting, subsoil blasting.

b) TNG

= It stands for trinitroglycerine. It is prepared by adding glycerol to a cooled mixture of conc. H_2SO_4 (60%) and conc. HNO_3 (40%) at 10°c with constant stirring



In the industry, glycerol is added by well stirring cooling of a mixture of conc HNO_3 and conc H_2SO_4 ensuring that the temperature of the reaction mixture does not rise up to 15°C otherwise it may result in a serious explosion. The reaction mixture is then quenched in a large volume of water and the product is washed & purified.

Uses

- It is used as direct explosive
- It is used as dynamite.

4. Write about enamels and varnishes? Write about semi-solid lubricants and their uses.

= Enamel is a pigmented-varnish paint which on drying gives a lustrous, hard and glossy finish. The properties of enamel depend largely on the nature of the varnish's vehicle & resin.

Varnishes are homogeneous colloidal dispersion- solution of natural and synthetic resin in oil or thinner or both It is used for protective and decorative coating of suitable surfaces which on drying leaves hard transparent, glossy, lustrous and durable film.

Semi-solid lubricants are obtained by dispersion of thickening agent in liquid lubricant. It can also be prepared by saponification of fat with an alkali. The consistency is governed by the amount of mineral oil present in it.

Uses of semi-solid lubricants

- used as friction reducer in automobiles.
- used in industries
- used as coolant in automobiles.

5. What are plastic explosives? Why is detonator required for the explosion of TNT?

= Plastic explosives are the combination of explosives that are in a polymer state and can be hand moulded and made into various shapes without any serious risk. They are mainly used for industrial applications and military uses.

TNT or trinitrotoluene in short is a high explosive which has low sensitivity to impact, high stability & low melting point. So under normal conditions, TNT doesnot explode. So a detonator is used to trigger a reaction which causes the main explosion of TNT.

6. Show your acquaintance to paints. Mention the importance of lubrication in engineering.

= Paint is the viscous suspension of finely divided solid pigment in a fluid medium, which on drying yields an impermeable film of powder. Paint is defined as the decorated and protective liquid or semi-liquid product that holds solid coloring materials in suspension.

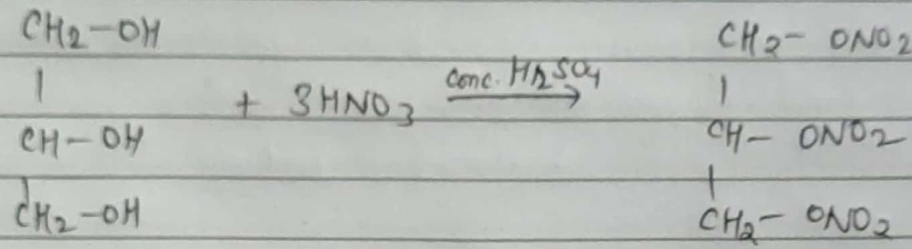
The importance of lubrication in engineering are:-

- To increase the efficiency of machines.
- To decrease the machine maintainence cost.
- To decrease friction and heat generation.
- To increase the life of machines.

7. Give the preparation and uses of glycerol trinitrate

= Glycerol trinitrate (GTN) is prepared by mixing of glycerol

with mixture of conc H_2SO_4 (60%) and conc. HNO_3 (40%) at 10°C with constant stirring.



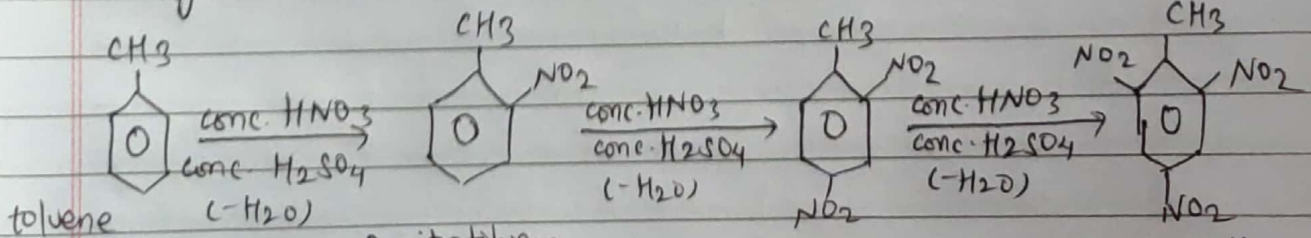
In the industry, GTN is prepared by adding glycerol with stirring to a cooling mixture of conc HNO_3 and conc H_2SO_4. It is ensured that the temperature of mixture does not exceed 15°C as it may lead to a deadly explosion. The reaction mixture is then quenched in massive volume of water and product is washed and purified.

Uses

- It is used as direct explosive
- It is used as dynamite.

8) Write the preparation and uses of TNT.

= TNT (trinitrotoluene) is prepared by nitration of toluene with conc. HNO_3 and conc. H_2SO_4 at 140°C, then at 180°C and finally at 230°C.



Uses

- It is used in air bond demolition
- It is used in rock blasting, subsoil blasting,