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PRESENTATION ON

# **PROPELLANTS- SOLID, LIQUID, GAS TYPE. GUN PROPELLANTS AND ROCKET PROPELLANT**

**CUFS 2416 EXPLOSIVE AND POST BLAST INVESTIGATION**

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B.SC. FORENSIC SCIENCE (SEM 6)  
SCHOOL OF FORENSIC SCIENCES  
BHUBANESHWAR CAMPUS

# CONTENT

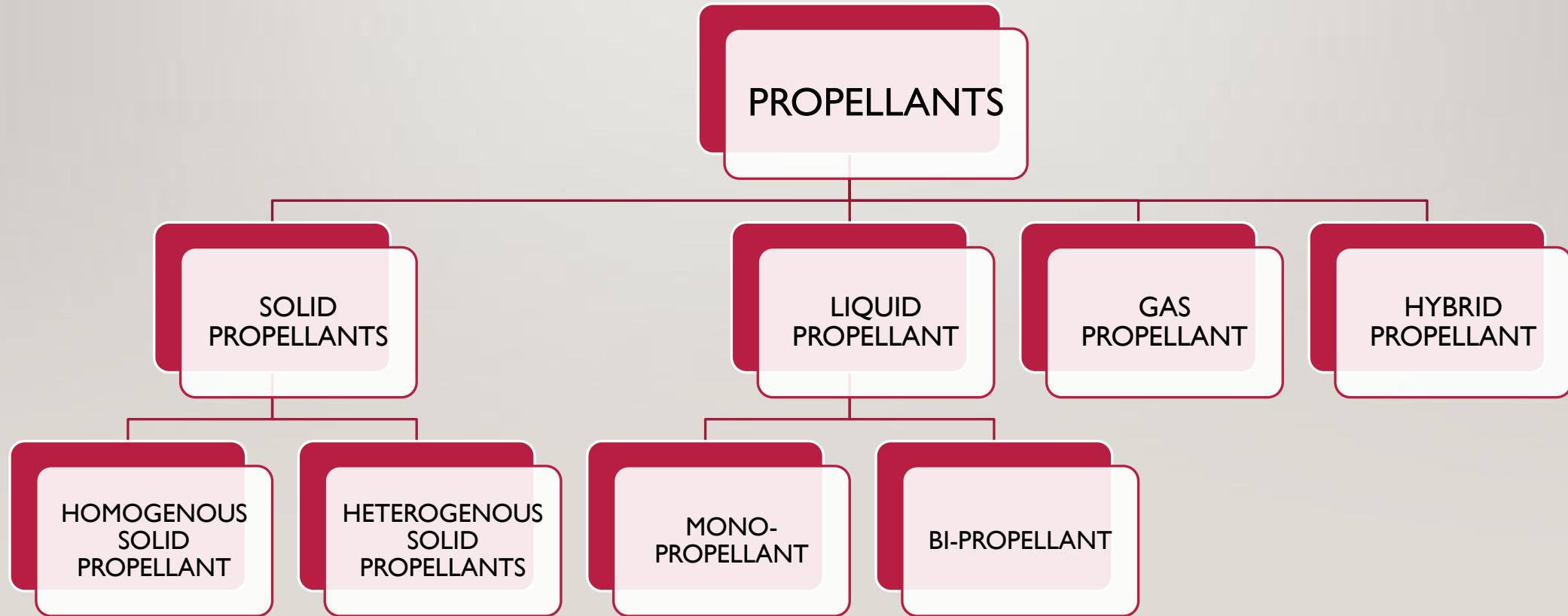
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- Propellant and its classification
- Its types :-
  - Solid Propellant (Composite )
  - Liquid Propellant (mono and bi )
  - Gas Propellant
  - Hybrid Propellant
- Gun Propellant
- Rocket Propellant

# PROPELLANT

A propellant is a chemical substance used in the production of energy or pressurized gas that is used to create movement of a fluid or to generate propulsion of vehicle, projectile, or other object.

## CLASSIFICATION OF PROPELLANT



# SOLID PROPELLANT

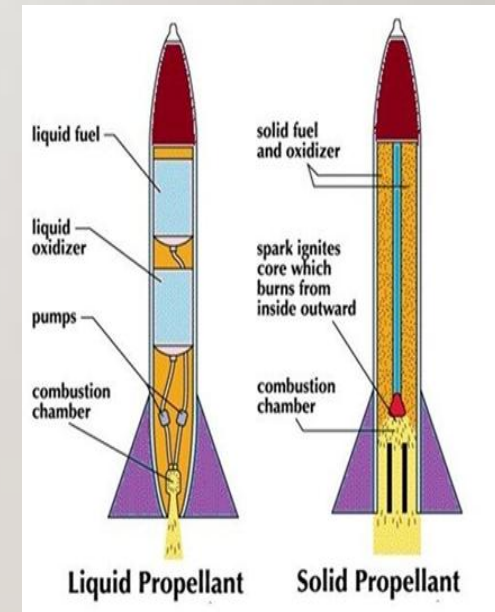
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## Homogeneous Solid Propellant:

- When solid propellant or a mixture of propellant is thoroughly mixed in a colloidal state, its called homogeneous solid propellant.

## Heterogeneous Solid Propellant:

- When an oxidizing agent is dispersed in a fuel mass, the solid propellant is called as heterogeneous or composite.



# LIQUID PROPELLANTS

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Liquid propellants are more versatile and the engine using them can be checked and calibrated more easily.

a) **Mono propellant** :- A monopropellant has fuel as well as oxidizer in thus same molecules or in a solution containing both.

**Ex-** Hydrogen peroxide, nitro methane.

b) **Bi propellant** :- In these ,liquid fuel plus oxidizer are kept separately and injected in the combustion chamber separately.

**Ex-** Liquid hydrogen, hydrazine, ethyl alcohol.

## **GAS PROPELLANTS**

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A gas propellant usually involves some sort of compressed gas. However, due to the low density and high weight of the pressure vessel, gases are seldom used at present.

## **HYBRID PROPELLANTS**

These are the propellants which consist of solid fuel and a liquid oxidizer. For example, liquid  $\text{N}_2\text{O}_4$  (liquid oxidizer) and acrylic rubber (solid fuel).

# GUN PROPELLANTS



Black powder



Smokeless Powder



Semi- Smokeless Powder

Composition :-

- Potassium nitrate(75%)
- Charcoal(15%)
- Sulphur(10%)

There are three types :-

- **Single base-** nitrocellulose (NC)
- **Double base-** nitrocellulose (NC) + nitroglycerine (NG)
- **Triple base-** nitrocellulose (NC)+ nitroglycerine (NG) + nitroguanidine (NGu)

- Semi smokeless powder is mixture of black powder and nitro cellulose.



**Nitrocellulose ( Single-base powders)**



**Nitroglycerin ( double-base powders)**

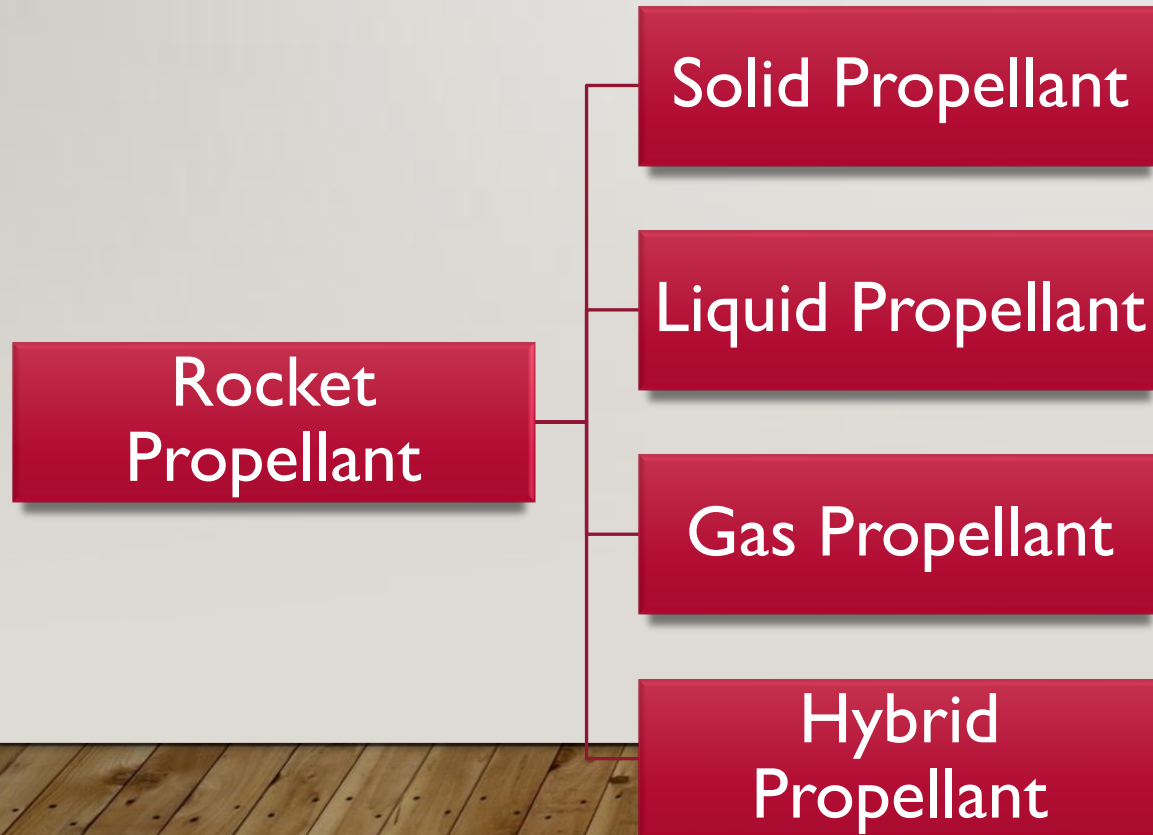


**Nitroguanidine ( triple-base powders)**



# ROCKET PROPELLANT

- Rocket propellant is the material used by a rocket engine to generate thrust.
- It consist of a fuel and an oxidizer that participate in chemical reactions to produce extremely hot gases.
- Example - Saturn booster rocket , Russian rockets ,Indian satellites SLV-3 and ASLV





**THANK YOU.**

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