



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities!*

PRESENTATION ON

LOW EXPLOSIVES

CUFS 2416 EXPLOSIVE AND POST BLAST INVESTIGATION

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

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BLACK POWDER

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INTRODUCTION TO EXPLOSIVES

- Any substance or device that can be made to produce a volume of rapidly expanding gas in an extremely brief period.
- An explosive material is an unstable substance containing sufficient oxidizer and fuel, whether as separate materials or attached in a single molecule, that becomes more stable through deflagration or detonation.
- There are three fundamental types:



Mechanical



Chemical



Nuclear

WHAT IS LOW EXPLOSIVE

- Low explosives deflagrate (burn) rather than detonate, they burn progressively, and the reaction is sub-sonic. The low explosives exert more of a pushing or heaving effect (when confined), and are generally used as propellant powders.
- Low explosives were sensitive to

Heat

Friction

Shock

Examples of low explosives include



Black Powder



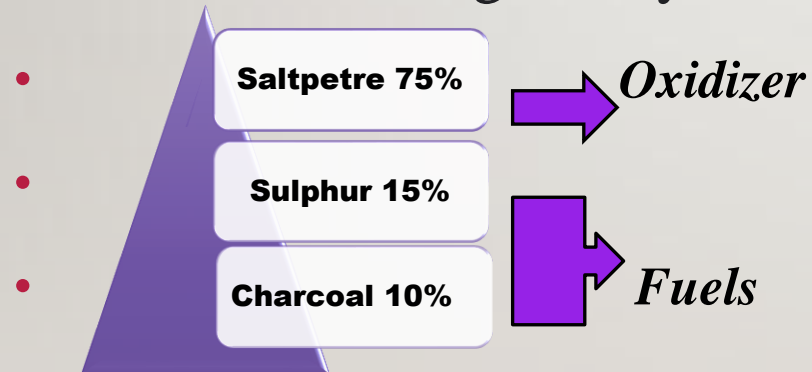
Smokeless Powder



Flash Powder

BLACK POWDER

- Black powder is **thought to have originated in China**, where it was being used in fireworks and signals by the 10th century.



REACTION OF COMBUSTION OF BLACK POWDER



- Lammot du Pont, an American industrialist, started making sodium nitrate powder in 1858. It became popular in a short time because, although it did not produce as high a quality explosive as potassium nitrate, it was suitable for most mining and construction applications and was much less expensive.

SMOKELESS POWDER

- In 1884, **Paul Vieille** invented a smokeless powder
- Smokeless powder are of



- They were corned into small spherical balls or extruded into cylinders or flakes using solvents such as ether. Other minor ingredients, such as stabilizers, plasticizers, binders were used.
- The properties of the propellant are greatly influenced by the size and shape of its grains. The surface of the grains influences the speed of burning, and the shape influences the surface and its change during burning. By selection of the grain shape it is possible to influence the pressure vs time curve as the propellant burns.

FLASH POWDER

- **Flash powder** is a pyrotechnic composition, a mixture of oxidizer and metallic fuel, which burns quickly and produces a loud noise regardless of confinement. It is widely used in theatrical pyrotechnics and fireworks (namely salutes, Eg: Cherry bombs, m-80s, firecrackers, and cap gun shots)
- Different varieties of flash powder are made from different compositions; most common are potassium perchlorate and aluminum powder. Sometimes, sulfur is included in the mixture to increase the sensitivity. Early formulations used potassium chlorate instead of potassium perchlorate.
- Flash powder compositions are also used in military pyrotechnics when production of large amount of noise, light, or infrared radiation is required, Eg: Missile decoy flares and stun grenades.

ANALYSIS OF LOW EXPLOSIVE

- Stereo light microscopy (SLM)
- polarizing light microscopy (PLM)
- scanning electron microscopy (SEM) with energy dispersive x-ray spectroscopy (EDX)
- Micro infrared spectroscopy (FTIR) along with chemical methods will be used to demonstrate the analysis of intact flash powder, black powder, and a post-blast explosion case where pyrodex was recovered.

APPLICATIONS

- Useful for mining rock or artillery shells, as artillery propellants
- Flares and fireworks
- Black powder is still widely used for ignition charges, primers, fuses, and blank-fire charges in military ammunition.

THANK YOU.

