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PRESENTATION ON

PYROTECHNIQUES , IT'S GENERAL FEATURES AND ADDITIVES

CUFS 2416 EXPLOSIVE AND POST BLAST INVESTIGATION

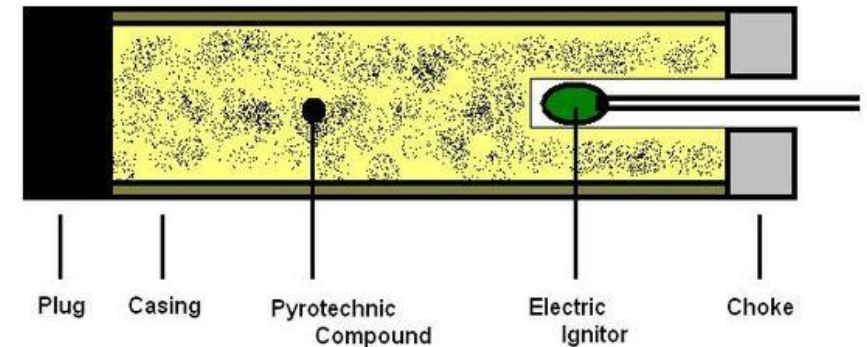
B.SC. FORENSIC SCIENCE (SEM 6)
SCHOOL OF FORENSIC SCIENCES
BHUBANESHWAR CAMPUS

CONTENT

- Introduction to pyrotechnic
 - A – composition
 - B – ignition train
- Types of pyrotechniques
- General features in pyrotechniques
- Additives used in pyrotechniques

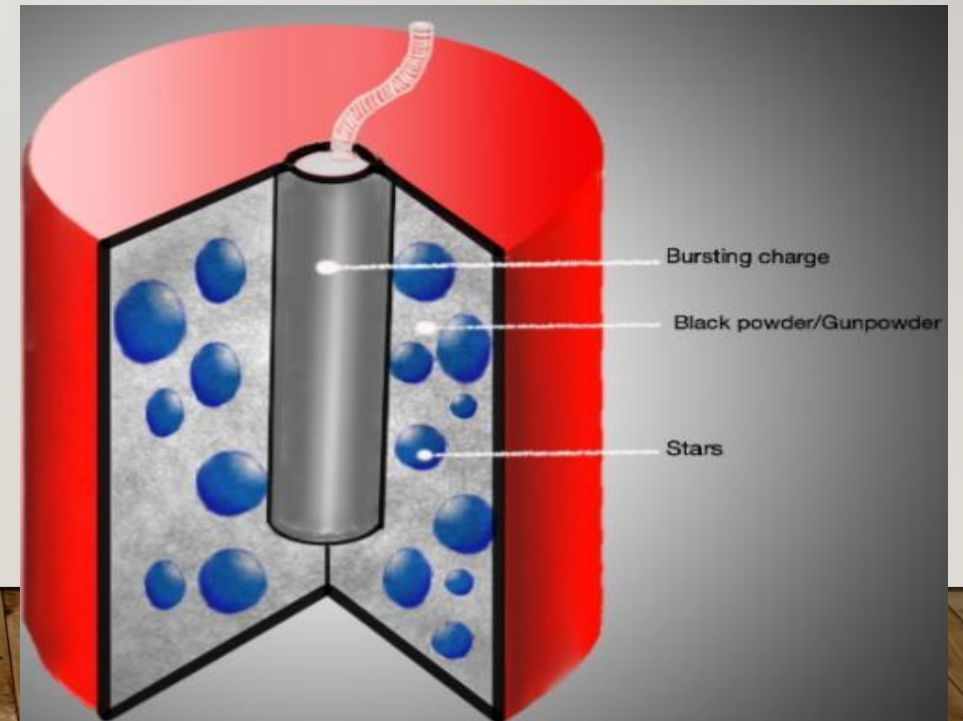
INTRODUCTION TO PYROTECHNIQUES

- The name comes from the Greek words pyr (“fire”) and tekhnikos (“made by art”).
- Pyrotechnics is the science of materials capable of undergoing self-contained and self-sustained exothermic chemical reactions for the production of heat, light, gas, smoke and sound.



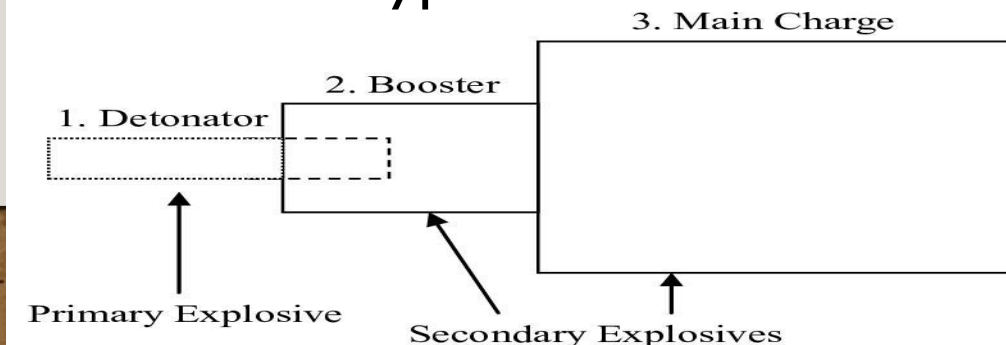
COMPOSITION:-

- Fuel :- (Metallic/non – metallic):Aluminum (Al), chromium (Cr), magnesium (Mg), manganese (Mn), titanium (Ti), boron (B), silicon (Si) and sulfur (S) etc. Oxidant
- Oxidant :- Chlorates, chromates, nitrates, oxides and perchlorates etc.
- Binders :
 - (i) Natural (beeswax, paraffin wax, shellac and boiled linseed oil etc.) and
 - (ii) man – made (Bakelite resin, polyester resin, polyvinyl chloride (PVC), chlorinated rubber, Thiokol rubber and epoxy resin etc).



IGNITION TRAIN:-

- Pyrotechnic items function by means of an ignition train. Each ignition train component performs a specific function at a point in the ignition sequence.
- All pyrotechnic items have an initiator and a main charge. There are no features to interrupt the train once initiated, so each component will function.
- Initiators:-
 - electrical igniter – Initiated by application of an electrical current.
 - Percussion primer – Initiated by striking with a firing pin or other type of striking device.
 - Friction igniter – Initiated by an abrasive force applied to match head type of material.
- Propelling charge and main charge





Noise generating pyrotechnic



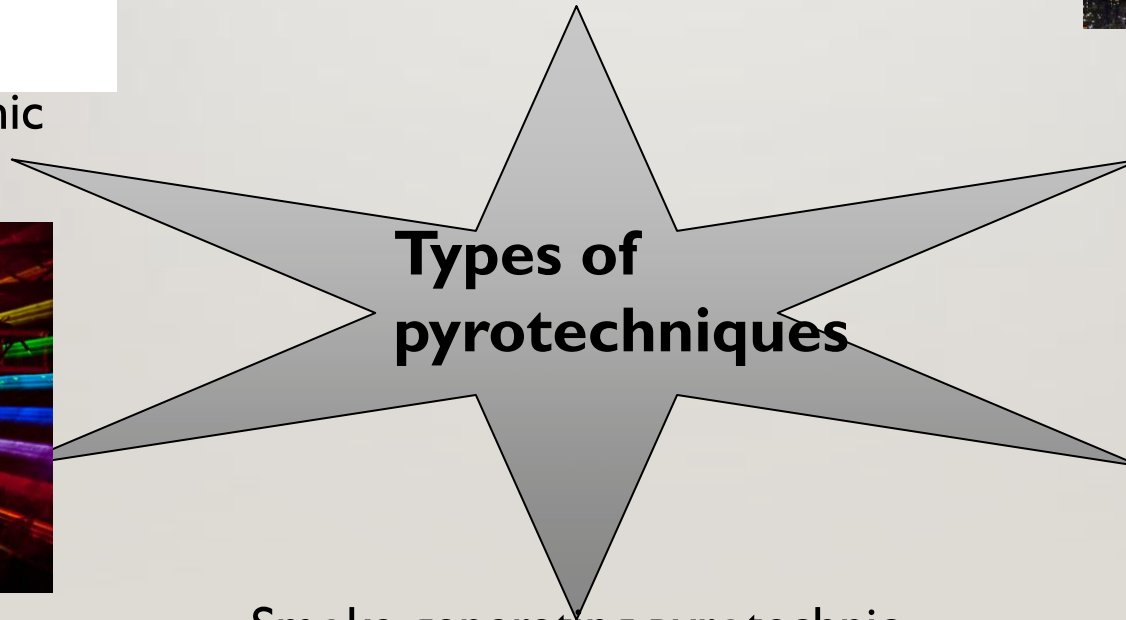
Military pyrotechnic



Civilian pyrotechnic



Light generating pyrotechnic



Types of pyrotechniques



Heat producing pyrotechnic



Smoke generating pyrotechnic

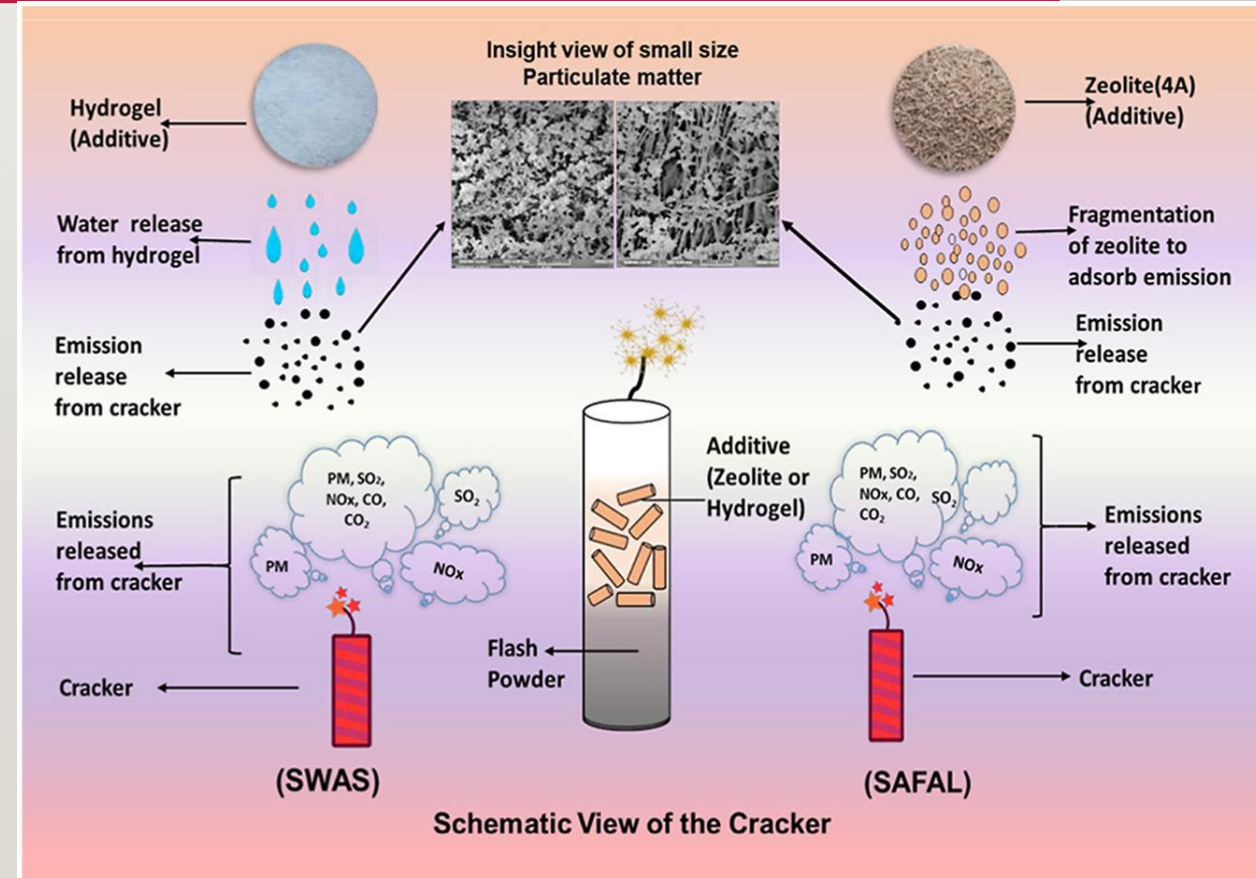
GENERAL FEATURES OF PYROTECHNIQUES:-

1. Pyrotechnic composition are intimate mixture of combustible fuel and oxidant which burn rapidly when ignited as loose powder.
2. Layer by layer combustion proceed from one end to other.
3. Composition intended to produce gas are generally based on carbonaceous fuel and oxidiser which burn to CO_2 and nitrogen where so-called gassless mixture are more lightly to contain metal powder or metal oxide
4. Gassless pyrotechnic burning rate is unaffected by change pressure and composition are very suitable on different altitude and an all under environment
5. The chemical reactivity of ingredients and particle size have significant effect on ignition.

ADDITIVES:-

Pyrotechnic composition were formulated rationally to reduce the detrimental impacts or damage on the environment by incorporating the functional additives

Ex-Oxidizers (nitrates, perchlorate),
fuel (aluminium, magnesium),
colouring agents (copper, potassium,
sodium etc.)



ADDITIVES:-

- Bonding agent- They include tris(1-(2-methyl) azirinidyl) phosphine oxide and triethanolamine.
- Plasticizers- dioctyl adipate, isodecyl pelargonate, and dioctyl phthalate
- Anticaking agents- fumed silica, Graphite.
- Coolants- Clay, diatomaceous earth, alumina, silica, magnesium oxide, or others)
- Strontium carbonate is used as a fire retardan
- Flame suppressants- Potassium nitrate and potassium sulfate are commonly used.
- Colorants- Usually salts of suitable metals, often barium, strontium, chlorin, calcium, sodium, copper, etc.

THANK YOU.

