FUNDAMENTALS OF SOLID PROPELLANT COMBUSTION

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COMMENTS ON WORKSHOP TOPIC

- It is very exciting to see that solid propellants are bring considered for gas generator application in fire extinguishment.
- Great Engineering Challenge!!

GENERAL BACKGROUND OF SOLID PROPELLANTS

(1) SOLID STATE SUBSTANCES WHICH CONTAIN BOTH OXIDIZERS AND FUEL INGREDIENTS

(2) ABLE TO BURN IN ABSENCE OF AMBIENT AIR OR OXIDIZERS

(3) NORMALLY USED TO GENERATE HIGH-TEMPERATURE COMBUSTION PRODUCTS FOR PROPULSION PURPOSES

(4) CLASSIFIED INTO TWO DIFFERENT TYPES (HOMOGENEOUS AND HETEROGENEOUS) BASED ON DIFFERENCES IN THEIR PHYSICAL STRUCTURE

CLASSES OF PROPELLANTS

- Homogeneous

  - Uniform physical structure.
  - Fuel and oxidizer are chemically bonded together.
  - Major constituents are nitrocellulose (NC) and nitroglycerine (NG).
  - Also referred to as double-base propellants.

- Heterogeneous

  - Non-uniform physical structure.
  - Polymeric fuel binder and crystalline oxidizers.
  - Also referred to as composite propellants.

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contains detailed discussions of the chemical origins of smoke secondary smoke formation and its modeling, homogeneous and heterogeneous nucleation of smoke, and various methods of reducing smoke of propellant products.