

FIRE BEHAVIOR

WHAT IS FIRE

- CHEMICAL REACTION
- RAPID OXIDATION THAT PRODUCES SELF SUSTAINING HEAT AND LIGHT

DEFINITION OF FIRE

- FIRE IS A RAPID CHEMICAL REACTION THAT GIVES OFF HEAT AND PRODUCTS OF COMBUSTIONS THAT ARE VERY DIFFERENT IN COMPOSITION THAN THE FUEL AND OXYGEN COMBINED TO CREATE THEM.

SCIENCE BEHIND FIRE

- GOVERNED BY THE LAWS OF PHYSICS. MASS AND DENSITY

ATOMS

IN THE NUCLEUS

- PROTONS(+ CHARGE)
- NEUTRONS(NO CHARGE)

ORBITING THE NUCLEUS

- ELECTRONS(- CHARGE)
- NO WEIGHT

MOLECULES

- MINIMUM OF TWO ATOMS
- SHARE ELECTRONS

TYPES OF ENERGY

- CHEMICAL- BOND BETWEEN ATOMS
- MECHANICAL- FRICTION
- ELECTRICAL- BATTERIES
- NUCLEAR- BOMBS

METHODS OF HEAT TRANSFER

- CONDUCTION- HEAT TRANSFERRED THROUGH AN OBJECT(METAL PIPE)
- CONVECTION- HEAT RISING (CAMP FIRE)
- RADIATION- TRANSFERRED THROUGH HEAT WAVES (THE SUNS RAYS)

WHAT EFFECTS FIRE

- TEMPERATURE-MORE HEAT=MORE ENERGY
- PRESSURE
- DENSITY- MORE DENSE= LONGER BURNING
- HUMIDITY
- FUEL LOAD

SPECIFIC GRAVITY

FLUIDS WEIGHT COMPARED TO WATER

- LESS THAN "1" FLOATS ON WATER
- MORE THAN "1" SINKS IN WATER

VAPOR DENSITY

GASSES WEIGHT COMPARED TO AIR

- LESS THAN "1" RISE TO THE SKY
- MORE THAN "1" LINGER ON THE GROUND

REACTION TYPES

- ENDOTHERMIC- ABSORBS ENERGY
- EXOTHERMIC- GIVES OFF ENERGY

PRODUCTS OF COMBUSTION

- FIRE GASSES (IN SMOKE)
- FLAME (LIGHT ENERGY)
- HEAT (RADIANT HEAT WAVES)
- ASK SMOKE (PARTICLES OF INCOMPLETE COMBUSTION)

TERMINOLOGY

- **FLASH POINT**- TEMP WHERE A GIVEN COMBUSTIBLE WILL PRODUCE SUFFICIENT VAPOR TO IGNITE
- **FIRE POINT**- GIVEN COMBUSTIBLE REACHES A TEMP HOT ENOUGH FOR SUSTAINED COMBUSTION
- **OXIDIZER**- SUPPLIES OXYGEN NECESSARY FOR FIRE TO OCCUR
- **REDUCER**- REACTS WITH OXIDIZER
- **FLAMMABLE RANGE**-IS THE RANGE OF A CONCENTRATION OF A GAS OR VAPOR THAT WILL BURN (OR EXPLODE) IF AN IGNITION SOURCE IS INTRODUCED.
 - **LOWER FLAMMABLE LIMIT**- GASOLINE 1.4%
 - **UPPER EXPLOSIVE LIMIT**- GASOLINE 7.6%
- **PYROLYSIS**- DECOMPOSITION THROUGH HEAT

LAWS OF PHYSICS

- **BOYLES LAW**- THE MORE GAS IS COMPRESSED THAT HARDER IT IS TO COMPRESS
- **CHARLES LAW**- GAS WILL EXPAND/CONTRACT PROPORTIONALLY IN RELATION TO TEMPERATURE

STAGES OF FIRE DEVELOPMENT

- IGNITION
- GROWTH
- FLASHOVER
- FULLY DEVELOPED
- DECAY

FIRE CLASSIFICATIONS

- A-ORDINARY COMBUSTIBLE FIRES
- B-FLAMMABLE LIQUIDS/GASSES FIRES
- C-ENERGIZED ELECTRICAL FIRES
- D-FLAMMABLE METAL FIRES
- K-COOKING OIL FIRES

FIRE EVENTS

- ROLLOVER
- FLASHOVER- SIMULTANEOUS IGNITION OF ALL CONTENTS IN A COMPARTMENT
- BACK DRAFT- SUPERHEATED OXYGEN STARVED COMPARTMENT THAT EXPLODES WHEN OXYGEN IS INTRODUCED.

FIRE TRIANGLE

- FUEL
- HEAT
- OXYGEN

FIRE TETRAHEDRON

- FUEL
- HEAT
- OXYGEN
- CHEMICAL CHAIN REACTION

METHODS OF EXTINGUISHMENT

- REMOVAL OF FUEL (STARVING)
- REMOVAL OF HEAT (COOLING)
- REMOVAL OF OXYGEN (SMOTHERING)
- INHIBITING THE CHEMICAL CHAIN REACTION

THREE TYPES OF EXTINGUISHER CARRIED ON AN ENGINE

- CO2 EXTINGUISHER
- PRESSURIZED WATER EXTINGUISHER
- DRY CHEMICAL EXTINGUISHER

LOCATION OF EXTINGUISHERS ON AN ENGINE

- ENGINEERS UPPER FRONT