



## FIRE INSTRUCTOR I Student Presentation Lesson Plan

### 5-Flaming and Nonflaming Combustion

#### Outline of Instruction

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#### Objective

Upon successful completion of this lesson, the student shall be able to:

- Explain the science of fire as it relates to energy, forms of ignition, and modes of combustion. [NFPA® 1001, 5.3.11]

#### Instructor Directions

1. Set up non-projectable training aids
  - a. Chart pad to include:
    - i. Title Page
    - ii. Acronym
    - iii. Summary
    - iv. 1 Application scenario
    - v. 2 Evaluation questions
2. Set up projectable training aids (LCD projector & computer)
3. Present lecture utilizing this outline of instruction, non-projectable and projectable audio visual aids.
  - a. Overall time 18 min. (set up, present topic, and take down of audio visuals)
  - b. Presentation time 8-12 min. (presentation time is part of the 18 min)
4. Breakdown of projectable training aids.

**Reference** Stowell, F.(2013). Essentials of Fire Fighting and Fire Department Operations (6<sup>th</sup> ed.). Upper Saddle River, N.J.: Brady Pub.; ISBN# 978-013-314080-4

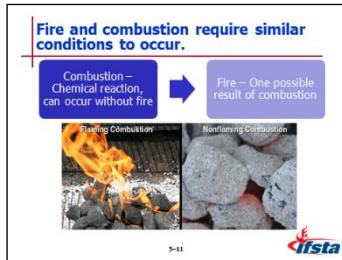
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## Preparation

### Introduction

- Instructor introduction
- Objectives
- Preparation Step

## Presentation



### Modes of Combustion

Fire, combustion similar conditions

Combustion is chemical reaction – Can occur without fire

Fire is one possible result of combustion

Two modes

Nonflaming – Occurs more slowly at lower temperature producing smoldering glow in material's surface

Flaming – Produces visible flame above material's surface; commonly referred to as fire

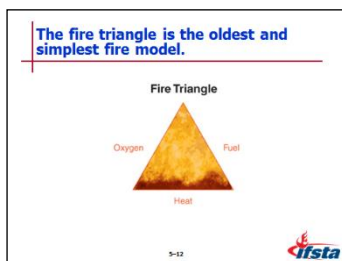
Fire Models – Explain elements of fire, how fires can be extinguished

Fire triangle

Oldest, simplest model

Three elements necessary – Fuel, oxygen, heat

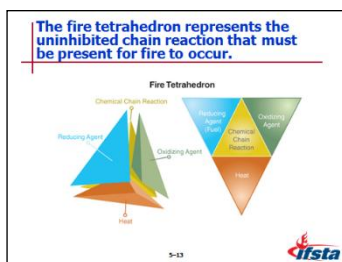
Remove any of elements, fire extinguished



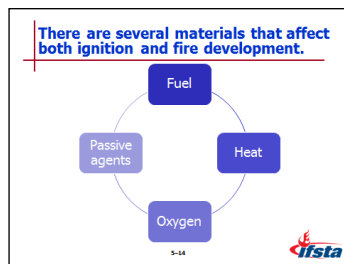
Fire tetrahedron

Uninhibited chemical chain reaction must be present for fire to occur

Created to explain fires involving certain types of substances, types of agents necessary to extinguish



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Materials that have effect on both ignition, fire development

Fuel

Heat

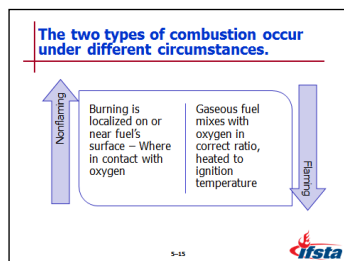
Oxygen

Passive agents – Materials that absorb heat but do not participate actively in combustion reaction

Drywall

Content of vegetation

Relative humidity in air outside of structures



Nonflaming combustion

Occurs when burning is localized on or near fuel's surface, where in contact with oxygen

Examples – Burning charcoal, smoldering wood or fabric

Fire triangle used to illustrate

Flaming combustion

Occurs when gaseous fuel mixes with oxygen in correct ratio, is heated to ignition temperature

Requires liquid or solid fuels to be vaporized or converted to gas phase through addition of heat

Fire tetrahedron reflect conditions required

Removing any element interrupts chemical chain reaction, stops flaming combustion

Even with elements removed – May continue to smolder

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## Chart Pad:

### Title Page

- Name, Department, Title of Presentation

### Acronym

- **L.I.P.** (Life Safety, Incident Stabilization, Property Conservation)  
instructor relates these priorities to the lecture

### Summary (2-4 key points)

- Instructor reviews 2-4 key points of the lesson plan to clarify uncertainties, prevent misconceptions, increase learning and improve retention

### Application (1 scenario)

- The student is given a scenario where the student will apply all of the knowledge that was given in the lecture. *This is not a question*, it is merely the explanation of the scenario.

### Evaluation (2 questions)

- Instructor should ask students 2 direct questions that were presented during the lesson. *Answer to the questions must be give after asking the question.*