



Fire Protection Training

Procedures Handbook 4300

FIRE PHYSICS & CHEMISTRY

TOPIC: Phases Of Fire

TIME FRAME: 30 Minutes

LEVEL OF INSTRUCTION:

BEHAVIORAL OBJECTIVE:

Condition: A written quiz

Behavior: The student will be able to identify the incipient, free burning, and smoldering phases of fire

Standard: With a minimum of 70% accuracy

MATERIALS NEEDED:

- Chalkboard
- Chalk

REFERENCES:

- IFSTA, Essentials of Fire Fighting, 2nd Edition, Chapter 1
- IFSTA, Fire Ventilation Practices, 6th Edition, Chapter 1
- Fire Attack, Emergency Resources Inc, 1987

PREPARATION: Fires go through various phases during the combustion process. Each phase is characterized by different conditions and differing potentials for violent fire behavior. As a firefighter your safety depends upon your ability to recognize the different phases of fire and the violent fire behavior associated with those phases.



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PRESENTATION	APPLICATION
<p>I. FIRE MAY OCCUR ANYTIME DAY OR NIGHT</p> <p>A. Fire in Occupied Buildings is Usually Discovered Early, Reported Early and Extinguished Before Severe Damage Occurs.</p> <p>B. Fires in Unoccupied Buildings Will Go Unnoticed and May Proceed Through the Three Phases of Fire.</p> <p>II. FIRST PHASE - INCIPIENT PHASE</p> <p>A. 21% Oxygen</p> <p>B. Small Fire, Low Heat</p> <p>C. Room Temperature Only Slightly Elevated</p> <p>D. Oxygen Drawn into Fire by Rising Convection Current</p> <p>E. Mushroom Column Occurs Consisting of Non-Flaming Gases</p> <p>F. Fire Temperature May Exceed 1000o, but Room Temperature Will Not</p> <p>G. Fire Produces Fire Gases</p> <ol style="list-style-type: none"> 1. H2O 2. Carbon dioxide (CO2) 3. Sulfur dioxide (SO2) 4. Carbon monoxide (CO) <p>III. SECOND PHASE - FREE BURNING PHASE</p>	<p>How many phases of fire are there?</p> <p>Information Sheet #1</p>



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PHASES OF FIRE

PRESENTATION	APPLICATION
<ul style="list-style-type: none"> c. Noticeable increases in smoke density and heat at all levels d. Smoking and blistering of combustible materials removed from seat of fire 	
<p>IV. THIRD PHASE - SMOLDERING PHASE</p>	
<ul style="list-style-type: none"> A. Less Than 15% Oxygen B. Extreme Heat C. High Smoke Generation, Dense Black D. Temperature May Exceed 1000o Throughout Room at All Elevations E. Flame Production Drastically Reduced F. Backdraft May Occur 	<p>Information Sheet #3</p> <p>What is backdraft condition?</p>
<ul style="list-style-type: none"> 1. Fuels within room are above their ignition temperature and vapor production, due to incomplete combustion pressurizes the room. The only missing element is oxygen. If oxygen is introduced at or below the level of the seat of the fire a violent explosion or backdraft may occur. 2. Backdraft warning signs <ul style="list-style-type: none"> a. Little or no flame visible b. Swirling dense smoke within structure c. Whistling sound of air being drawn inward 	<p>Information Sheet #4</p>



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PHASES OF FIRE

PRESENTATION	APPLICATION
<ul style="list-style-type: none">d. Smoke forcefully discharged outward through all exterior cracks and openingse. Windows heavily covered with liquid black residuef. Doors and windows too hot to touch <p>3. Backdraft prevention</p> <ul style="list-style-type: none">a. Do not allow personnel to enter prior to ventilationb. Ventilate at highest safe point above the seat of the firec. Be aware, condition could exist in a single room within a structure, exercise caution	



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SUMMARY:

There are three phases of fire:

1. First Phase - Incipient Phase
2. Second Phase - Free Burning Phase
3. Third Phase - Smoldering Phase

Firefighters must be able to identify which phase a fire is in order to protect themselves from violent fire behavior phenomena associated with second and third phase fires.

EVALUATION:

A written quiz.

ASSIGNMENT:

To be determined by instructor(s).