

MIDDLE SCHOOL FIRE SCIENCE

Columbia Fire Department



Five Common Types of Fire Hazards Found In The Home

- Cooking
- Smoking
- Heating
- Improper storage of chemicals
- Electronics

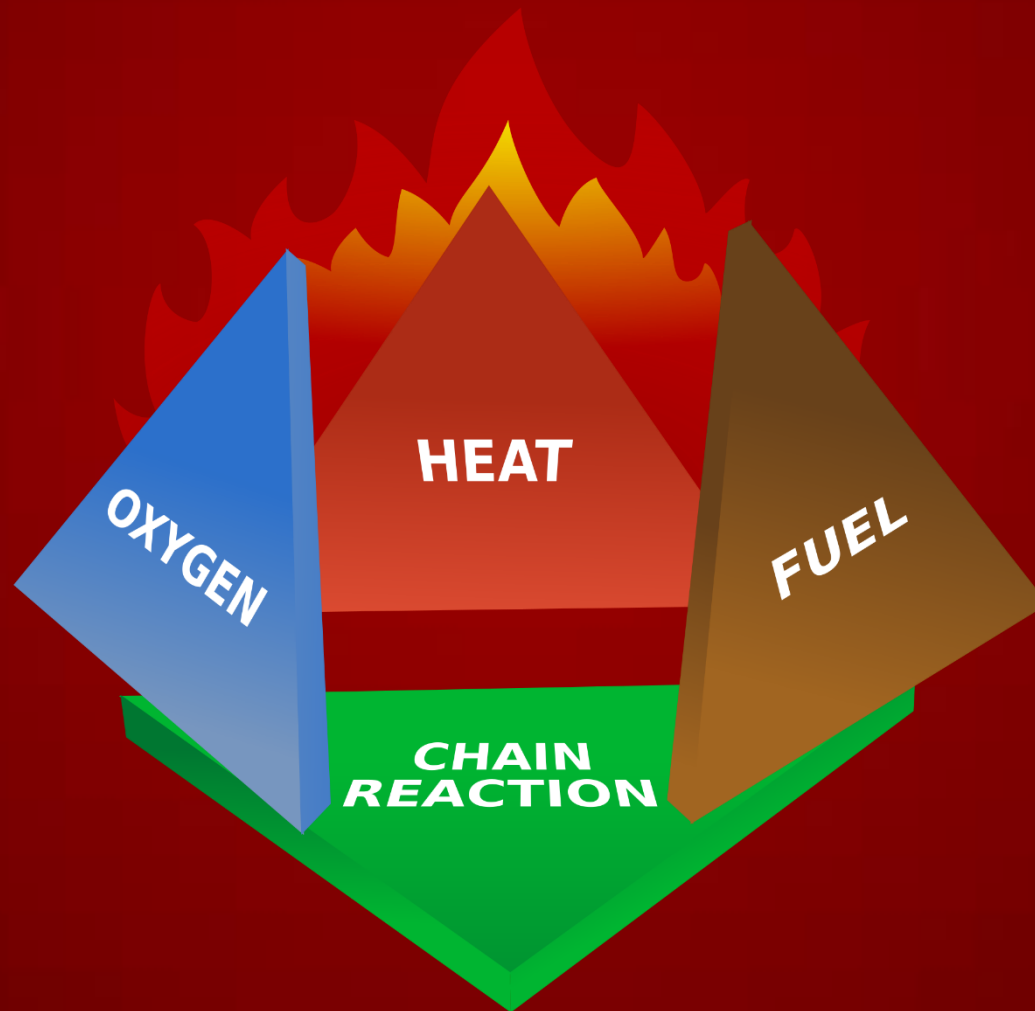
Five Types of Fire Hazards Found Outdoors

- Campfires
- Bonfires
- Smoking
- Matches and lighters
- Unmanaged Tress and brush



The Process of Combustion

THE FIRE TETRAHEDRON



The Process of Combustion

FOUR PARTS OF THE TETRAHEDRON

1. **Fuel**- any substance than undergoes combustion
2. **Heat**- heat energy sufficient to release vapor from the fuel and cause ignition
3. **Oxidizing Agent**- air containing oxygen
4. **Chemical Chain Reaction**- sufficient exothermic reaction energy to produce ignition

The Process of Combustion

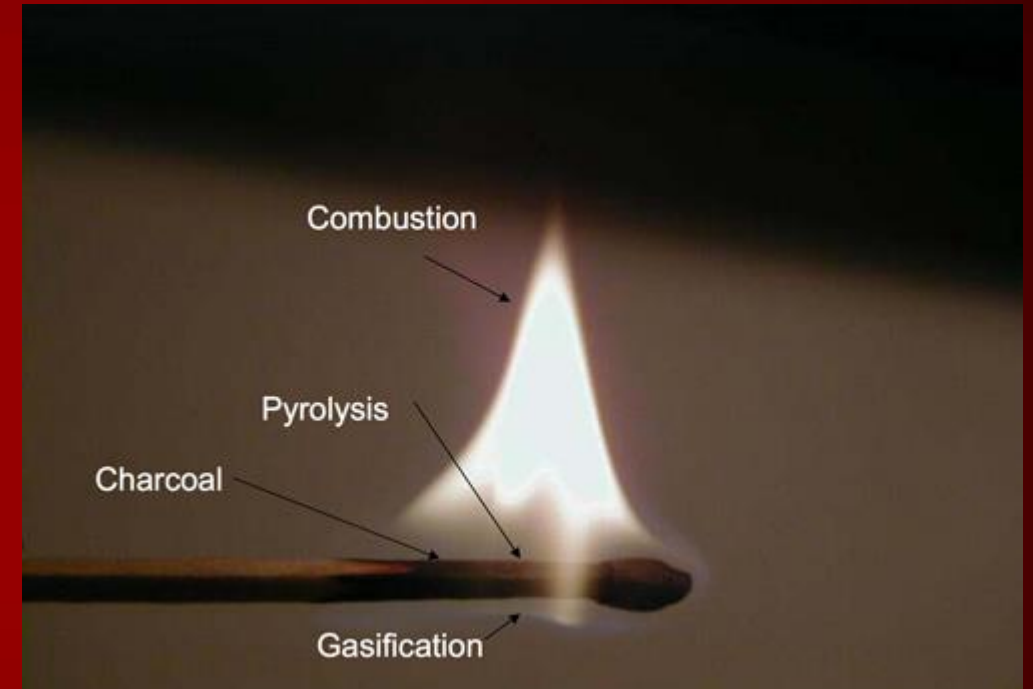
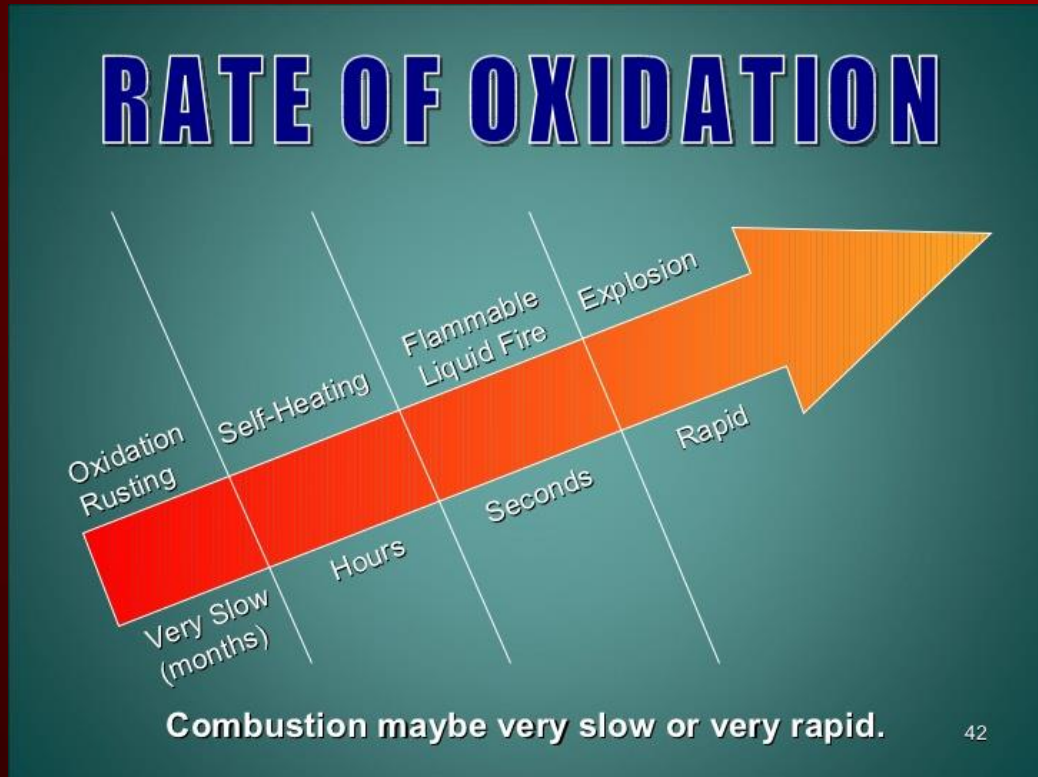
Combustion: the act or process or burning.

1. Chemistry

- a. Rapid oxidation accompanied by heat and usually light
- b. Chemical combination attended by production of heat and light.
- c. Slow oxidation not accompanied by high temperature and light.

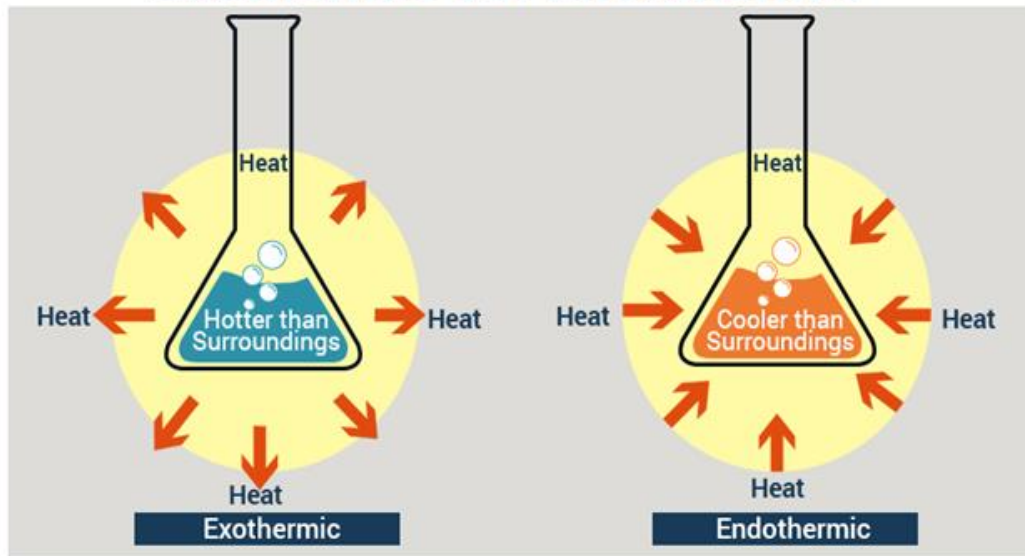
The Process of Combustion

Oxidation: a chemical reaction involving oxygen combining with other materials

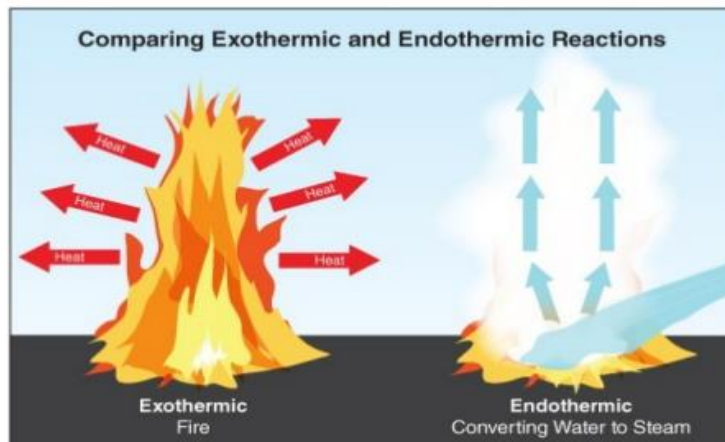


Pyrolysis: the subjection of organic compounds to very high temperatures resulting decomposition.

Exothermic Vs. Endothermic



There are two types of energy reactions that you should understand.

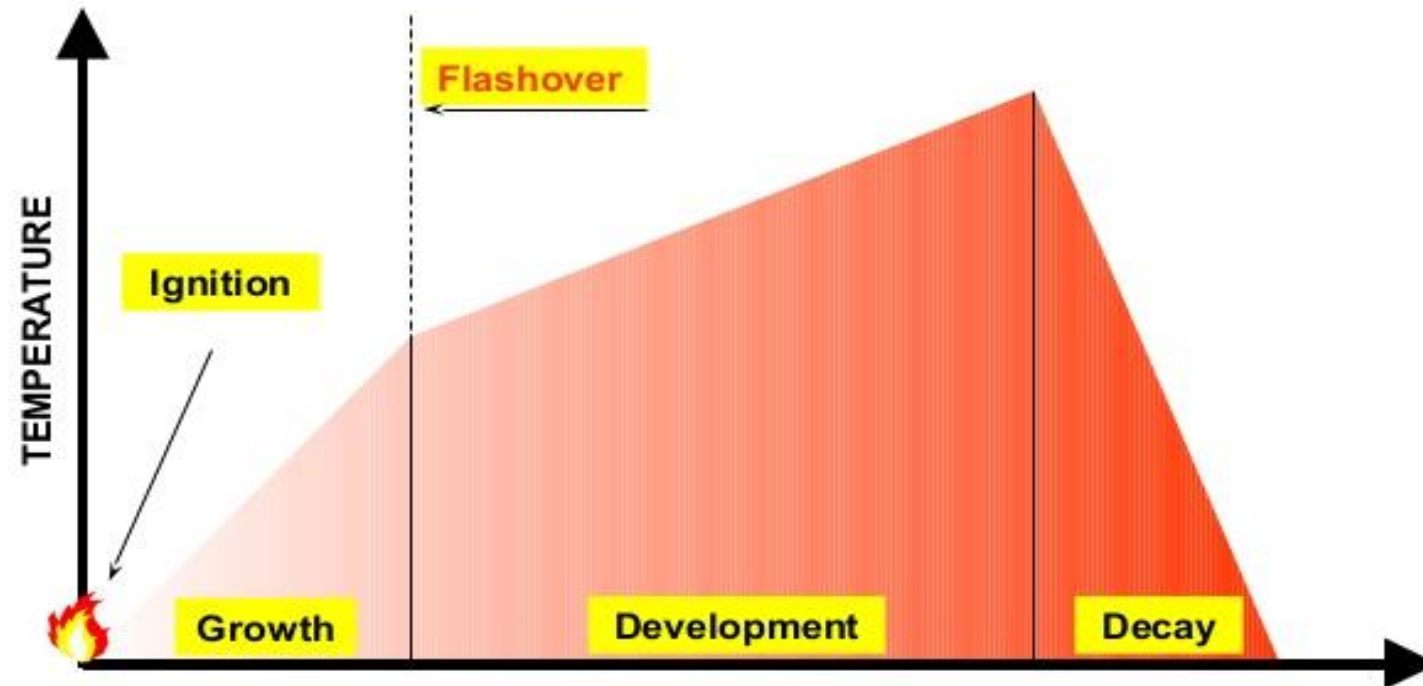


- **Exothermic reaction**: pertaining to a chemical change that is accompanied by a liberation of heat. (Fire is an exothermic reaction that releases energy as heat and light)

- **Endothermic reaction**: process or reaction in which the system absorbs energy from its surroundings; usually, but not always, in the form of heat

Stages of Fire

Timeline of a Fire



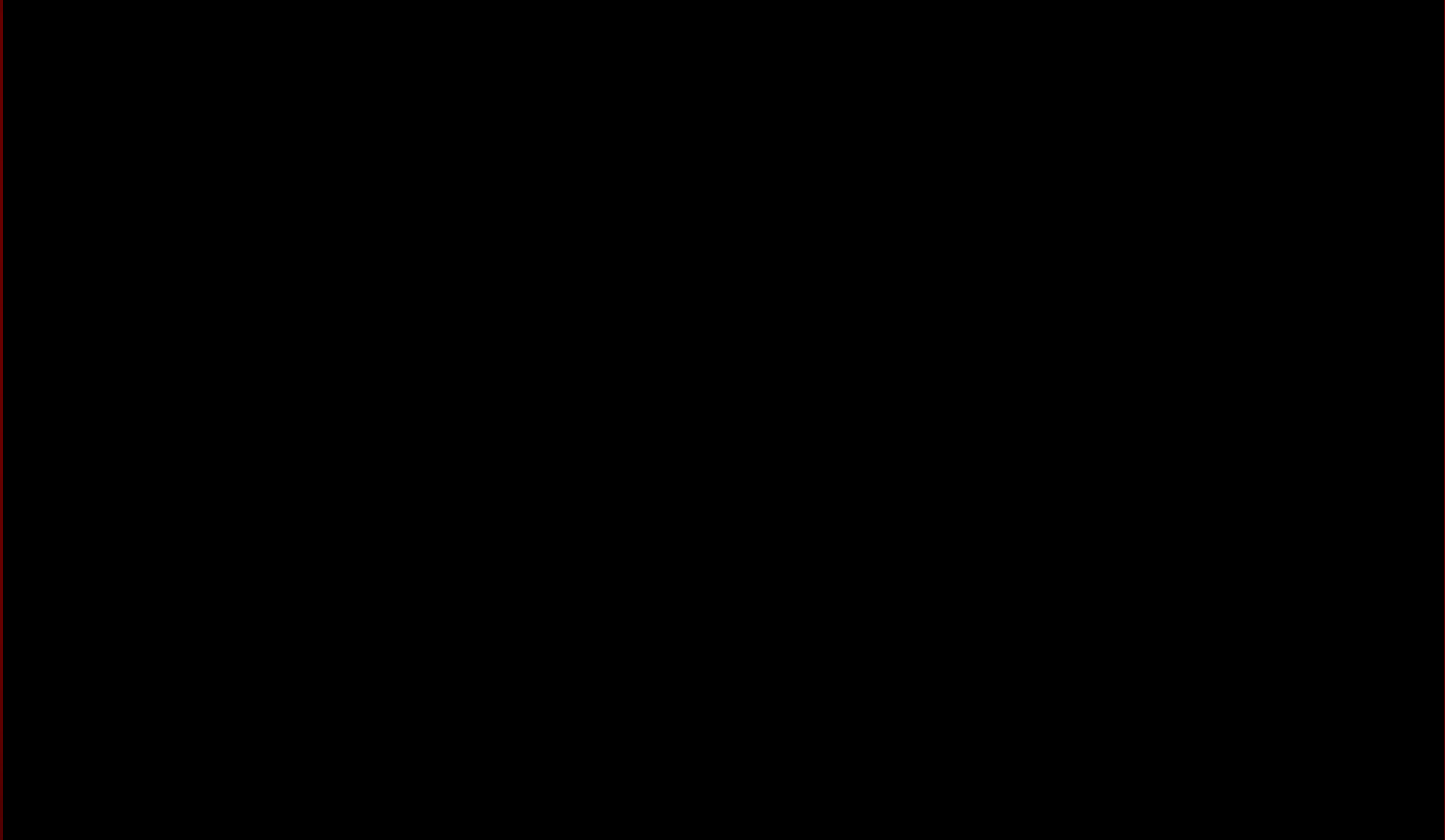
Fires are very difficult to control once it crosses the flashover stage. Therefore, calling fire brigade ASAP makes all the difference

Stages of Fire

- **Flashover**: the near-simultaneous ignition of most of the directly exposed combustible material in an enclosed area. When certain organic materials are heated, they undergo thermal decomposition and release flammable gases.



NATIONAL FIRE PROTECTION ASSOCIATION “FIRE POWER”



FIRE INVESTIGATION



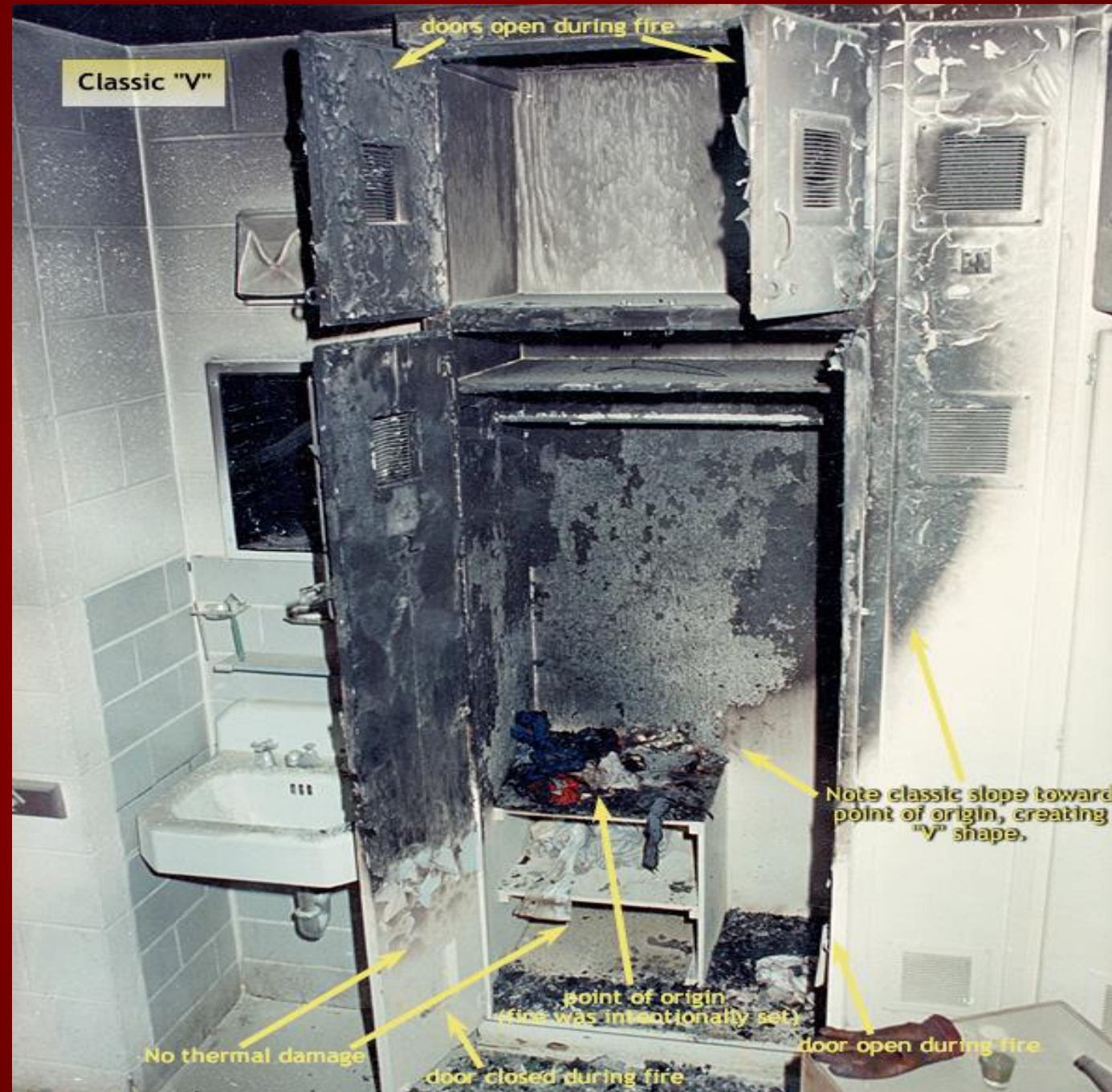
SCENE INVESTIGATION

- Goal is to find origin and cause
- Information from crews/bystanders
- External survey

INTERNAL INVESTIGATION

- Least to most damage
- V Pattern
- Charring depth/severity

PATTERNS



“V” PATTERN EXCEPTIONS

- Dropdown
- Flashover
- High fuel or accelerant at origin

SCIENTIFIC METHOD



SCENE 1

- 2000 Hours
- House foreclosed 6 months prior











SCENE 2

- Alarm time 1437
- Sunday after Thanksgiving
- College condo complex
- Single company response for investigation











SCENE 3

- 2000 hours
- Family came home and heard smoke alarms sounding
- Smoke when opening garage





REMEMBER:

- Every second counts, plan two ways out
- Never play with matches or lighters
- Call 9-1-1 as soon as possible.
 - Only Call 9-1-1 for true emergencies
- Never intentionally set a fire. This is dangerous and illegal.

