**Arson:** willful and malicious burning of property

http://www.fcafire.com/

**Role of the Investigator:**
1. To determine the ORIGIN of the fire
   - V-pattern: lowest & hottest point; fire burns upwards & outwards
   - Origin burns longest, hottest, most extensive
   - Fire line: fires seeks O$_2$ burns up
   - Combustible materials: increase the intensity & extent of fire
   - Fire will rise faster as it gets hotter
   - Look for different temperature conditions
   - Multiple Points of Origin: don’t happen randomly
   - Use of an accelerant
   - Streamers or Trailers: connect areas that are wanted to burn
   - Source of ignition: every fire has a source of ignition
   - Matches, lighter, cigarette, fireplace

   Direction of Travel of fire: affected by air currents, walls, stairs

   ![V-pattern](http://www.roberts.ezpublishing.com/croberts/burn.htm)

   Figure 1a depicts the classic V-pattern relied upon by many investigators. When hot gases from a fire rise in a natural convection mode, (as a result of heat related gas buoyancy) the gases tend to spread out as they rise, forming a V. Consequently, the fire investigator looks to the base of the V as the origin of the fire. In Figure 1a, the soot pattern, on the walls of the home, has spread outward near the eaves, suggesting that the fire origin is at grade level (arrow). Soot patterns inside the home were less severe, suggesting that the fire started on the outside of the wall.

2. To determine the CAUSE of the fire
   - Detection of accelerant using dogs or “sniffers”
   - Substance used to initiate/promote the spread of fire
   - Sniffer detects changes in O$_2$ levels
   - Searching out an intentional spill or pour pattern.
   - The red striped reference sensor is set back from the suspect area with the green striped sensor acting as the search sensor. As the probe is moved around the pattern is marked to verify the pour area.

   ![Sniffer](http://www.pragmatics-arson.com/onsite.htm)

   The older Model 920 tracked back to the proximity of the reference sensor and found a nearly continuous pour pattern.

**Collect samples at scene of suspected arson**
- common accelerants insoluble in H$_2$O
- use clean metal cans
- analyze in lab using gas chromatograph: separates liquids on basis of boiling point

**Other Factors to Consider**
- “For Sale” sign hidden
- few personal possessions
- no food in refrigerator or cabinets
- property over-insured


**Difficulties of an Arson Investigation**
1. Much of the evidence is destroyed!

2. Other evidence is transformed
   - Metals melt; others decompose

3. Destruction and alteration of structures: sometimes by firefighters!

4. Smoke and stench

http://www.ci.houston.tx.us/hfd/divisions/arson.htm
What Kills People in Fires?
1. Heat: body temp can’t exceed 109°F
2. Inhalation of Hot Gases: causes edema of mucosal tissues
3. Smoke: agglomerations of carbon from incomplete combustion particles are very hot and may carry toxic chemicals
4. Carbon Monoxide: lethal blood concentration varies from 20% to 80%; kills many victims before exposed to fire
5. Anoxia: inadequate oxygen to support life normal air contains 21%; at levels below 10% death will occur
6. Flames/Incineration: “pugilistic posturing”
7. Blunt Trauma

From talk given by John DeHaan, PhD., Criminalist, Fire-Ex Forensics, Inc. Vallejo, CA. July 23, 2003

Firesetting Behavior:
1. Accidental/Curiosity
2. Thought Disordered: setting fires secondary to hallucinations
3. Delinquent: begins early adolescence Most grow up and out of firesetting 1/3 grow up to criminal life, but not firesetting
4. Thrill Seeking: first set fires around age 12 Have set at least 40 fires by first arrest Only kind that returns to scene within 24 hrs Single white males
5. Revenge: white male; average age of first fire is 15 Poor school performance with above ave. intelligence Family motto is “Get even”
6. Disordered Coping: begins before the age of 5 Setting fires is emotional coping mechanism Not likely to be arrested as an arsonist
7. Fraud
   a. Business: Case example- Boston building, 1986
   b. Professional arsonists: no early childhood firesetting behavior Highly specialized “craft”; rate is $5000

From talk by Dian Williams, PhD., President, Center for Arson Research, Lafayette Hill, PA. July 23, 2003

Waterford Fire - 7/13/97 Cause: Pot on Stove
Ridge Condominium Fire - 8/28/00 Cause: Arson (Covering up a robbery)
10th Street Car Fire - 7/9/97 Cause: Unknown
1919 Goodyear Fire - Aug. 2, 2002 Cause: Unknown
Threat Seeking: first set fires around age 12 Have set at least 40 fires by first arrest Only kind that returns to scene within 24 hrs Single white males
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