Lithium-Ion Batteries and the Fire Investigator

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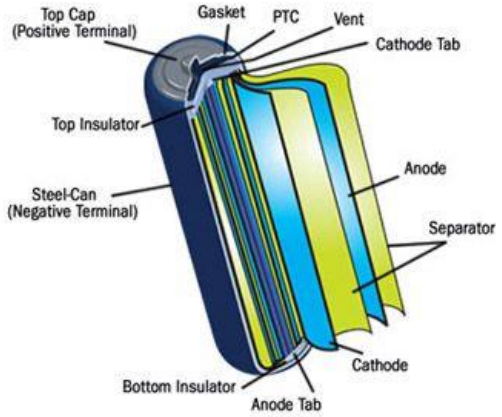
Cause or Affect?



E-scooter and laptop fires

- https://youtu.be/ld00r-tEEJ4?si=CZACO2bkReOKcNiY

- https://www.youtube.com/clip/UgkxzLM1JkKWAJyDOOwZO1qt4UqZWyrEOrOF

Fire Investigation

"Back to Basics"

- Scientific Method for Fire Investigation.
- A forensics based methodology

1. Recognize the need.
2. Define the problem.
3. Collect data
4. Analyze data
5. Develop hypothesis
6. Test hypothesis
7. Select final hypothesis.

Fire Investigation

Data Collection:

- New or used
- OEM or third party
- History of product, funtionality
- History of use, drops, physical damage
- Proper battery identification (lithium-ion vs. alkaline)

Fire Investigation

Hypothesis development:

- Location of battery or device
- Correct charging or power cord
- Battery components
- Proper battery identification (lithium-ion vs. alkaline)
- Pre and post fire conditions
- Photos, video, surviellance

Fire Investigation

Hypothesis testing:

- Events and factors
- Ignition squence
- Exploding cells
- Multiple fire locations
- Firefighting and overhaul
- Preservation of potential evidence

Fire Investigation

Causation:

- Battery failure modes leading to thermal runaway
- Electrical abuse (over-charging, over current)
- Mechanical abuse (impact, puncture)
- Thermal abuse (external radiant heat or flame impingement)

E-scooter causes house fire

- https://youtu.be/yRPW8zN_c0E?si=PP9Hl-yU8BWZNdmR&t=71

Fire Investigation

Summary:

- Cause or Affect
- Scientific Method
- Data collection
- Hypohtesis development
- Hypothesis testing
- Preservation of evidence
- Origin and Cause determination