

SAE G27 Packaging Tests



Federal Aviation
Administration



Presented to: Systems Group

By: FAA Fire Safety

Date: 5/2018

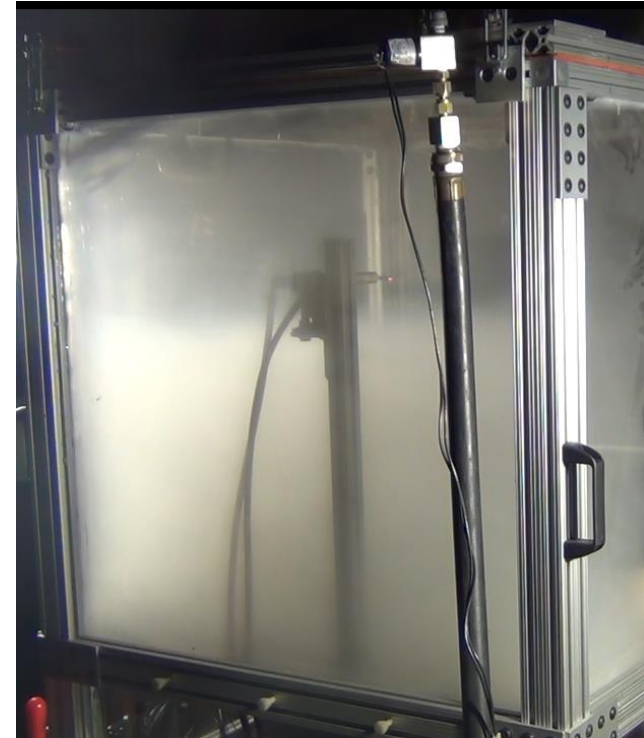
Background

- **SAE is creating a packaging standard.**
- **The standard includes a chamber that will fill up with battery gasses.**
- **The gasses in the chamber collect and eventually ignite.**
- **A foundation for the test method is the dispersion of flammable gasses in the chamber until the entire volume reaches the LFL uniformly.**



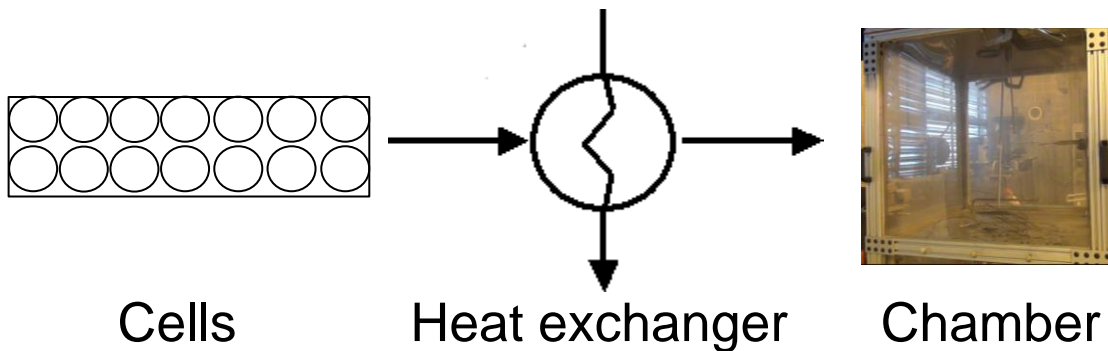
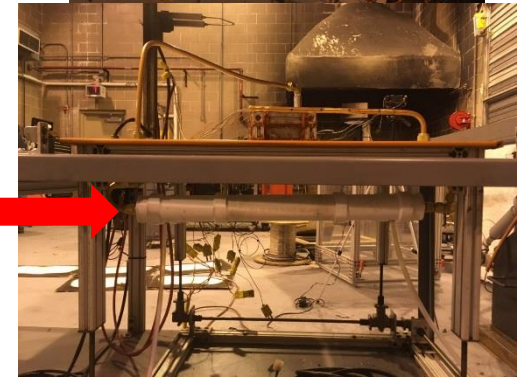
Introduction

- **Motivation for this work was based on a few experiments that showed smoke stratification.**
- **Key question: Is smoke stratification an indicator of flammable gas stratification?**



Setup

- 14 Cells were placed in a sealed box
- The sealed box was ducted through a heat exchanger and then into the chamber.

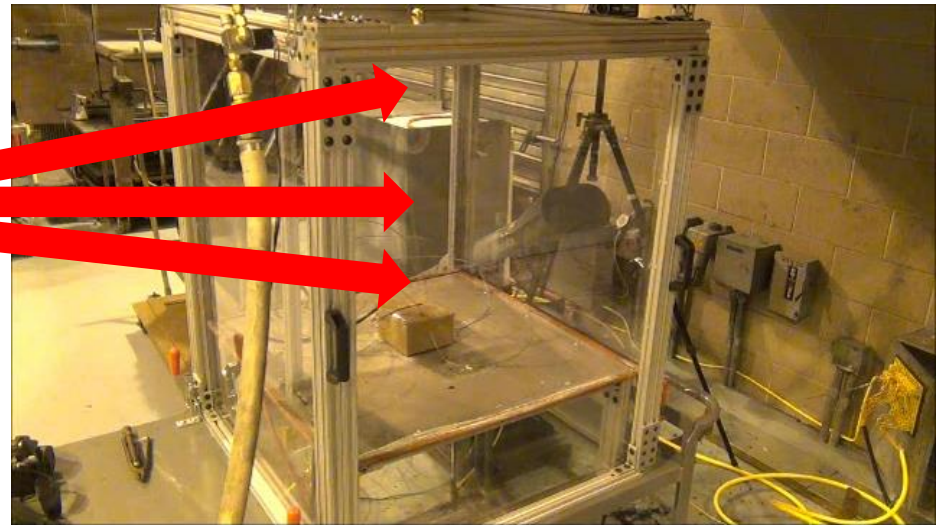


Setup (continued)

- Hydrocarbon gas samples were collected at 3 positions in the chamber. The top, the middle and the bottom.

Hydrocarbon Gas
Sample Ports

- 2" from top
- Center
- 2" from bottom



Video

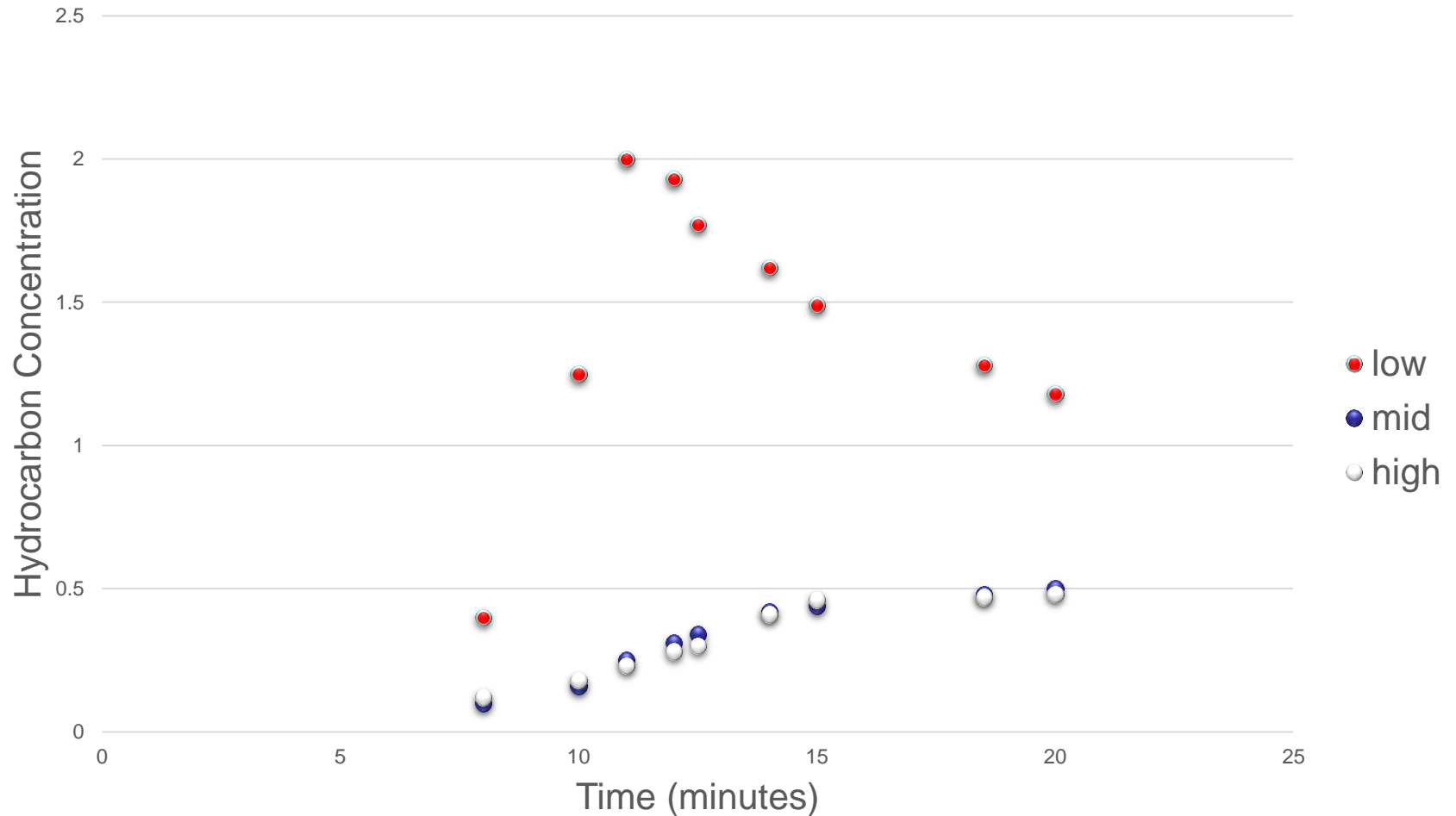
Packaging Tests

September 2017



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Battery Gas Stratification



Discussion

- **The height of the smoke shown in the video is consistent with the hydrocarbon measurements.**
 - A component of the smoke is flammable hydrocarbon gas.
- **More tests could be conducted to study other gasses such as hydrogen and carbon monoxide to assess whether they entrain with the hydrocarbons or stratify differently.**

Summary

- **Stratification of smoke is an indicator hydrocarbon gas stratification.**
- **A mixing fan may be a suitable solution to non-uniform gas mixtures.**



Questions?

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