

# GC-MS TECHNIQUES FOR OFF-ODOR AND OFF-FLAVOR ANALYSIS

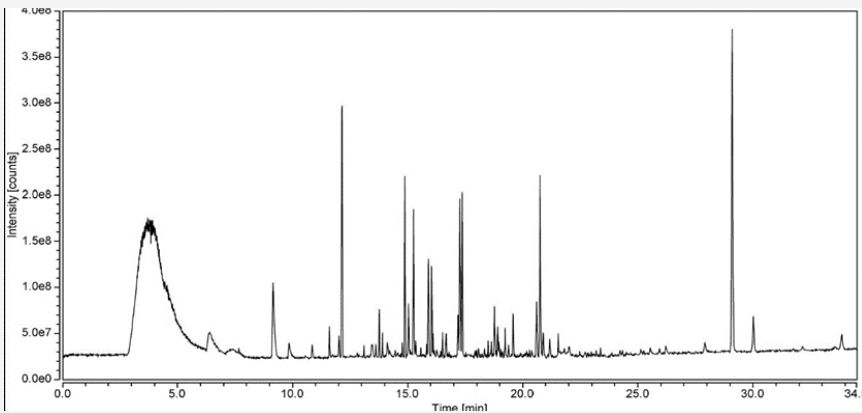
HOW SCIENTISTS USE VOLATILE PROFILES TO DETERMINE THE CAUSE OF ODOR AND FLAVOR ISSUES

## 3 Sources of Off-Odor and Flavor

1. Packaging Issues - Incompatibility can lead to flavor leaching and scalping
2. Chemical or Microbial Contamination - Result of storage, cleaning, handling, and user errors
3. Production Issues - Equipment errors, process error, ingredient issues

## Gas Chromatography - Mass Spectrometry

GC-MS analyzes the aromatic/volatile profile of a sample



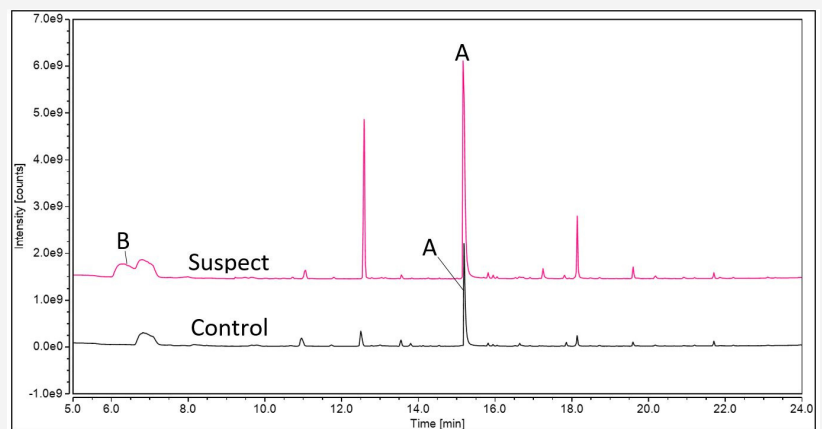
Each peak represents an individual compound. All compounds work together to create the overall aroma and flavor profile.

Compound	RT (min)	Odor/Aroma
Methyl-pyrazine	11.28	Nutty, roasted
2,5-dimethyl-pyrazine	12.31	Nutty, roasted
2,6-dimethyl-pyrazine	12.41	Nutty, roasted
4-propyl-pyridine	13.40	Green, fatty
2,3,5-trimethyl-pyrazine	13.74	Nutty, roasted
Acetic acid	14.27	Sour, acidic
1-(acetyloxy)-2-propanone	14.50	Fruity
Furfural	14.56	Bready, baked
Benzaldehyde	15.65	Almond, cherry



## Comparing Control and Suspect Samples

- Off-odor analysis looks at the different peaks between control (good) and suspect (bad) products
- Differences in peak height (A) and presence/absence of peaks (B) give clues to the source of flavor and odor issues



## Case Study

Fruit juice was reported to have an unusual odor.



GC-MS analysis identified 3 peaks in the suspect sample (top line, pink) not found in a control batch (bottom line, black) of the same juice.

Isopropyl alcohol, 4-(1-methylpropyl)-phenol, and 2,4-dichlorophenol are compounds that suggest cleaning agent contamination

