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Definitions

- **ENDS:** Electronic Nicotine Delivery Systems, like e-cigarettes.
- **Thermal Degradation:** The breakdown of chemicals when heated.
- **Volatile Organic Compounds (VOCs):** Harmful chemicals that can easily become gases.
- **Carbonyls:** Chemicals including aldehydes and ketones, often toxic.
- **Polycyclic Aromatic Hydrocarbons (PAHs):** Harmful chemicals formed during the burning of organic substances.

Key Findings

- Heating flavors used in e-cigarettes and tobacco products produces harmful chemicals.
- Higher temperatures (750°C) increase the production of toxic substances like formaldehyde, acetaldehyde, and benzene.
- Lower temperatures (250°C) also produce harmful chemicals but in different quantities.
- The specific harmful chemicals vary based on the flavor being heated.

Introduction

This study investigates the harmful chemicals produced when flavors used in e-cigarettes and tobacco products are heated. The research aims to understand how different flavors break down at various temperatures and what toxic substances are released.

Main Content

Background

Many e-cigarettes and tobacco products use flavors to make them more appealing. These flavors, though safe to eat, are not tested for safety when inhaled after being heated. This study examines the chemicals released from heated flavors and their potential health risks.

Methods

- **Flavorant Heating:**
 - Four flavors (cinnamaldehyde, eugenol, menthol, and vanillin) were heated at 250°C and 750°C.

- Heating was done in a controlled setup to capture and analyze the released chemicals.
- **Sample Collection:**
 - Different methods were used to collect various types of chemicals:
 - VOCs were collected with special canisters.
 - Carbonyls were captured using cartridges.
 - PAHs and other compounds were collected using filters and cartridges.
- **Chemical Analysis:**
 - Advanced techniques like gas chromatography and mass spectrometry were used to identify and measure the chemicals.

Results

- **High Temperature (750°C):**
 - **Cinnamaldehyde:** Produced high levels of benzene and formaldehyde.
 - **Eugenol:** Increased levels of benzene and acetaldehyde.
 - **Menthol:** High levels of formaldehyde and acetaldehyde.
 - **Vanillin:** Produced benzene and other harmful chemicals.
- **Low Temperature (250°C):**
 - All flavors produced harmful chemicals like benzoic acid but in lower quantities compared to high temperatures.

Conclusion

Heating flavors used in e-cigarettes and tobacco products creates a variety of harmful chemicals. Higher temperatures generally produce more toxic substances. This study highlights the potential health risks of inhaling these chemicals and underscores the need for more research and regulation of flavored e-cigarettes and tobacco products. Reducing or eliminating the use of certain flavors could help protect public health.

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