Confiscated Vape Collection and Testing

2023-2025 Collection and Testing Findings

Presented by

Public Health Response to Research
Grantees of the Vermont Department of Health

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Over two school years (2023-2025)we collected *512 confiscated nicotine vapes and vaping products* from high schools and middle schools across VT.



OUR PROCESS

1

Connected with Scientists

We built partnerships j ith national and international scientists researching the health impacts of vaping, compiled independent studies, and co-hosted a scientific summit j ith the Vermont Department of Health.

Working j ith scientists j hose j ork is funded independent of the vaping industry,

2

Collected Confiscated Vapes from Middle and HIgh schools in VT

Coordinated statej ide vape collection by contacting prevention j orkers and school staff. Collected or arranged delivery of confiscated vapes, labeling and sealing them by school. Schools j e couldn't visit provided photo documentation.

3

Cataloged & Documented Vapes

Maintained a spreadsheet tracking each vape's location, brand, flavor (if knoj n), and photo, noting unbranded items. Regularly proofread to ensure data accuracy.

4

Sent Vapes for Testing

We sent vapes in to scientists j ho tested them for volatile organic compounds, heavy metals and ketene.



Collection Overview

(2023-2024 School Year)

Confiscated nicotine vapes/vaping related objects:

300

VT counties represented:

14

** Essex county was from a store*

Schools represented:

24

Brands collected

56

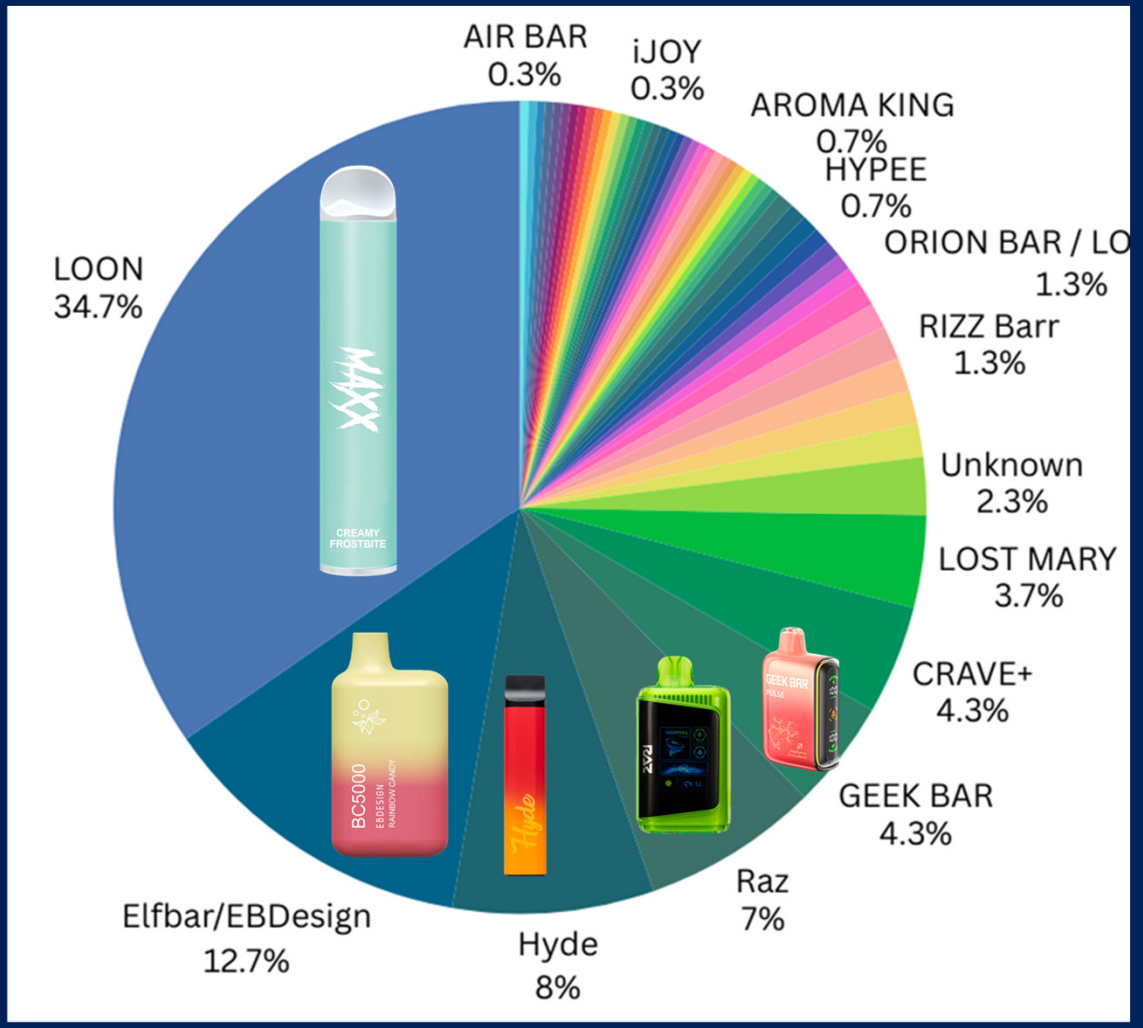
Collection Results
(2023-2024 School Year)

Disposable Vapes
249 - 83%

Not Tobacco Flavored:
298 - 99%

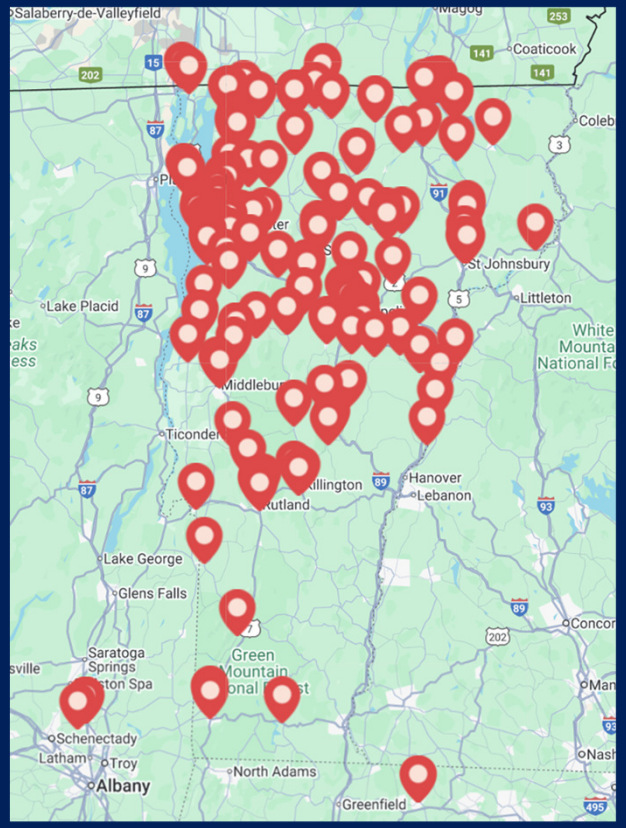
FDA Approved Vapes
2 - <1% (vuse)

One Off Vapes
37 - 12%

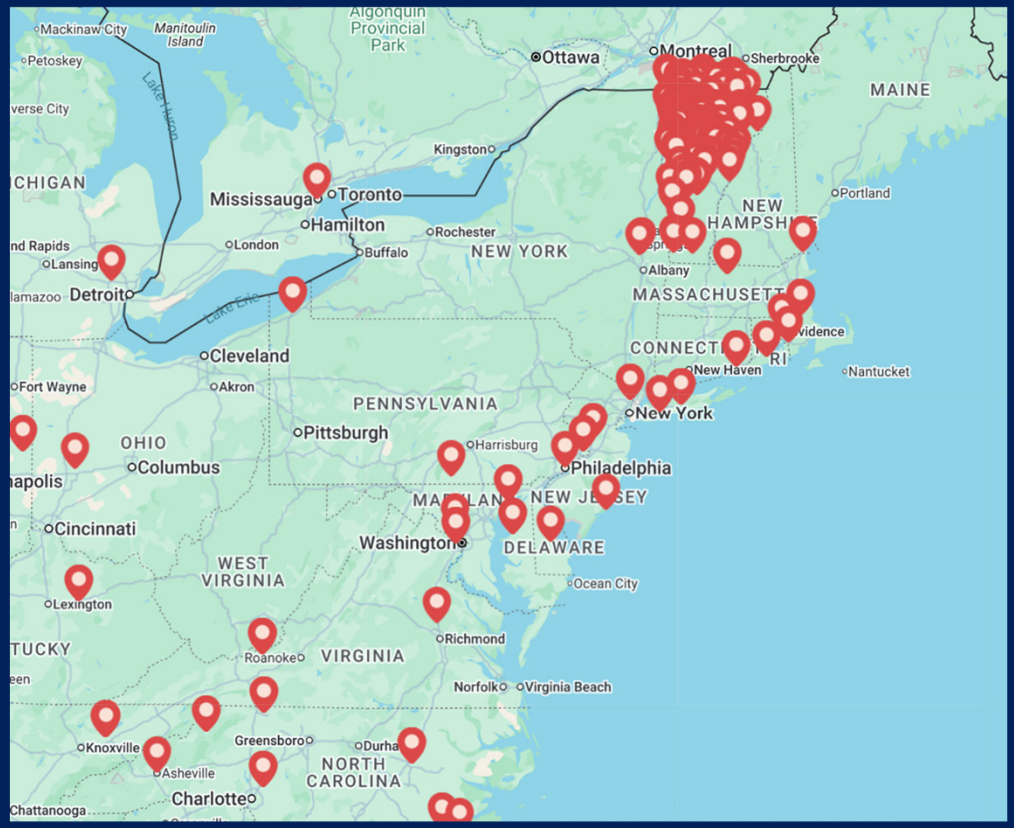


Loon Retail Map

Map of Loon Retailers in VT

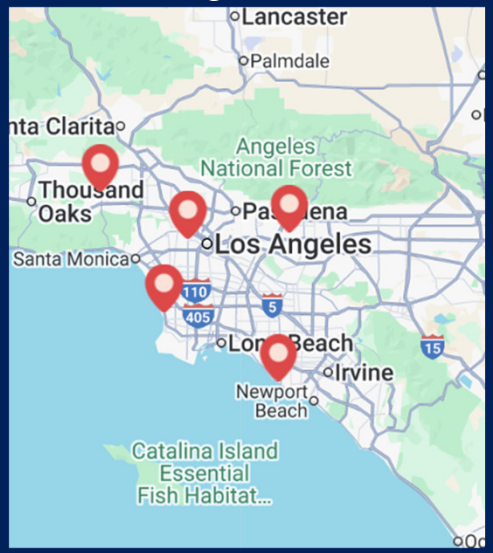


Map of Loon Retailers in Eastern US

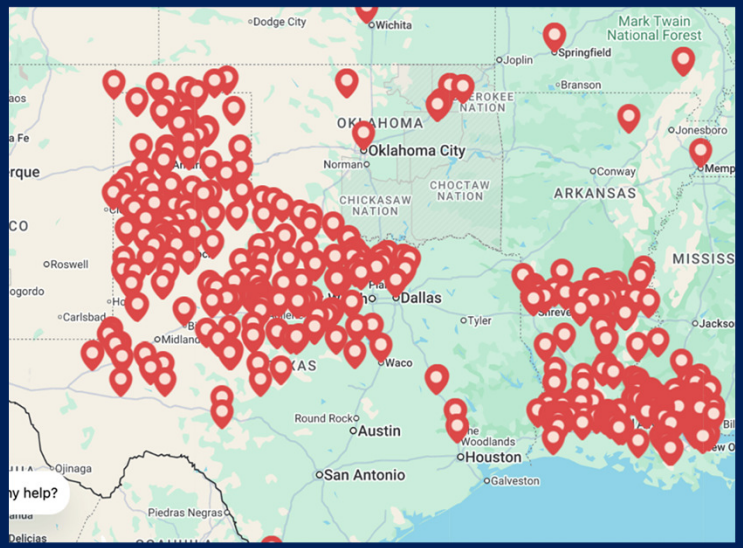


Loon Retail Map

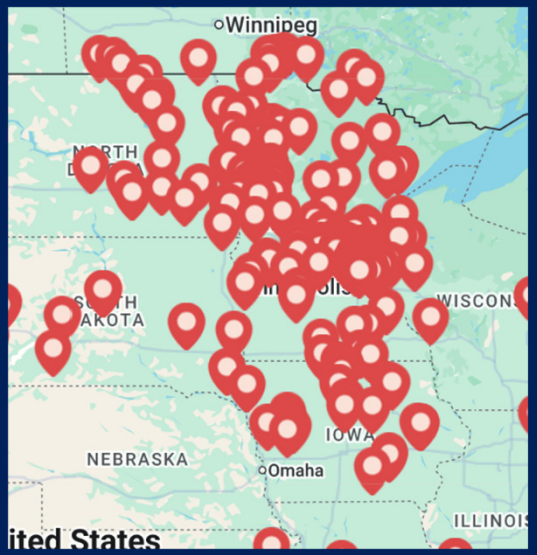
Map of Loon Retailers in Los Angeles



Map of Loon Retailers in Texas and Louisiana



Map of Loon Retailers in Minnesota



Collection Results Takeajays

(2023-2024 School Year)

TOP BRAND: Loon

% of total collection 104/300 - **34.7%**

% of schools - 17/24 - **71%**

% of counties - 11/14 - **79%**

Collection Overviej

(2024-2025 School Year)

Confiscated nicotine vapes/vaping related objects:

212

VT counties represented:

12

Schools represented:

21

Brands collected

34

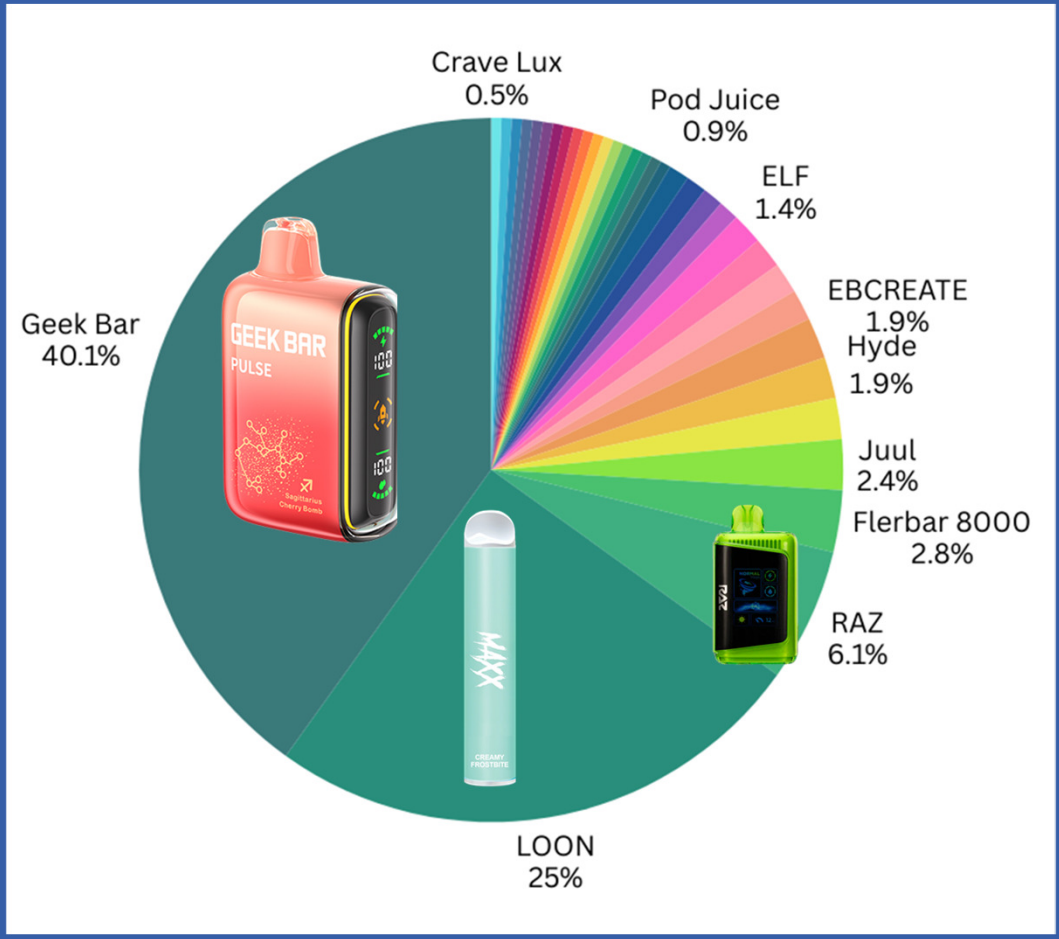
Collection Results
(2024-2025 School Year)

Disposable Vapes
194 - 92%

Not Tobacco Flavored:
212 - 100%

FDA Approved Vapes
5 - <1% (vuse and juul)

One Off Vapes
23 - 11%



Collection Results Takeajays

(2024-2025 School Year)

2024 - 2025 Collection - Geek and Raz

% of total collection - 98/212 - **46%**

% of schools that had geek and/or Raz - 19/21 - **90%**

% of counties that had geek and/or Raz - **100%**

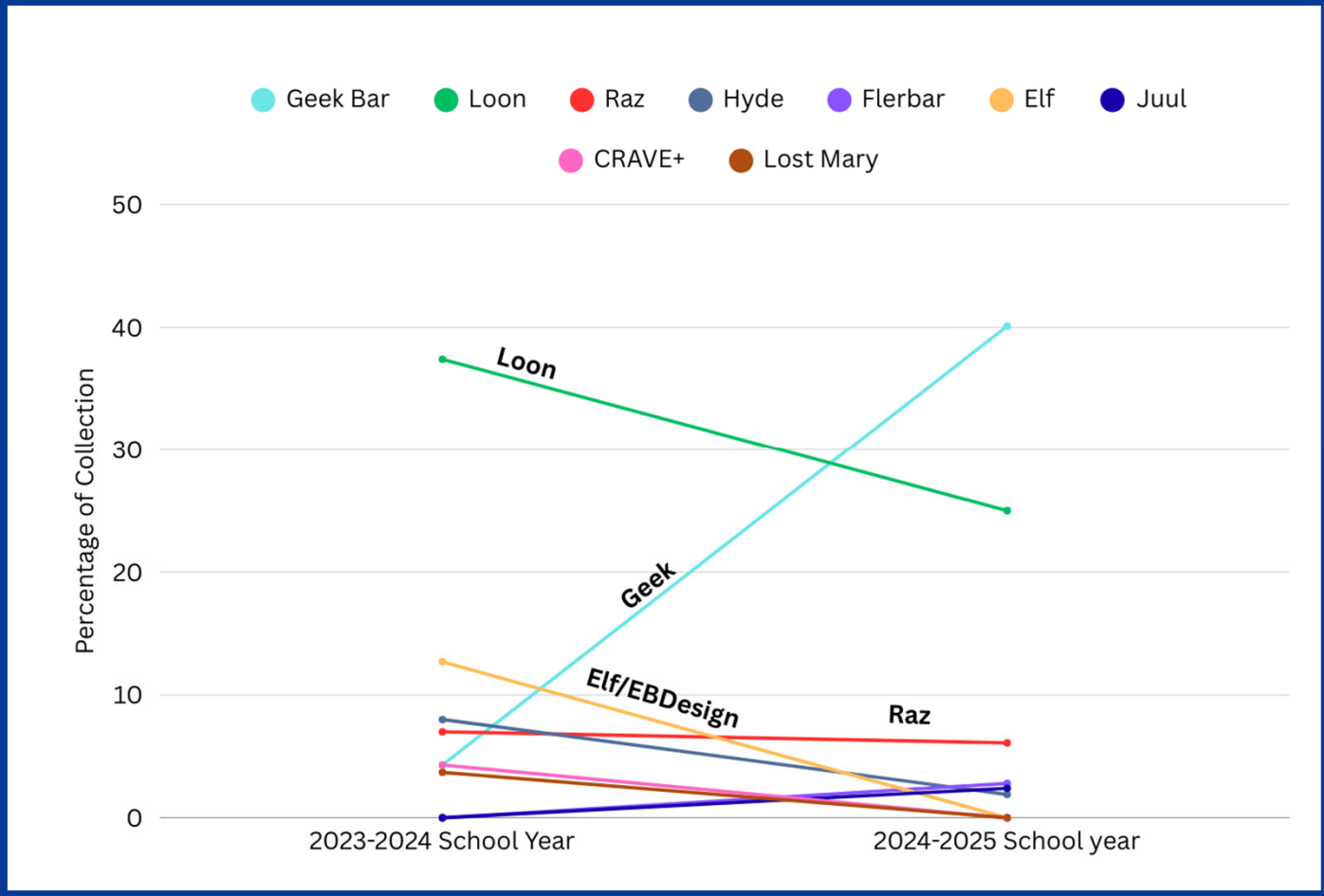
2024 - 2025 Collection - Geek

% of total collection - 85/212 - **40.1%**

% of schools that had geek - 15/21 - **71%**

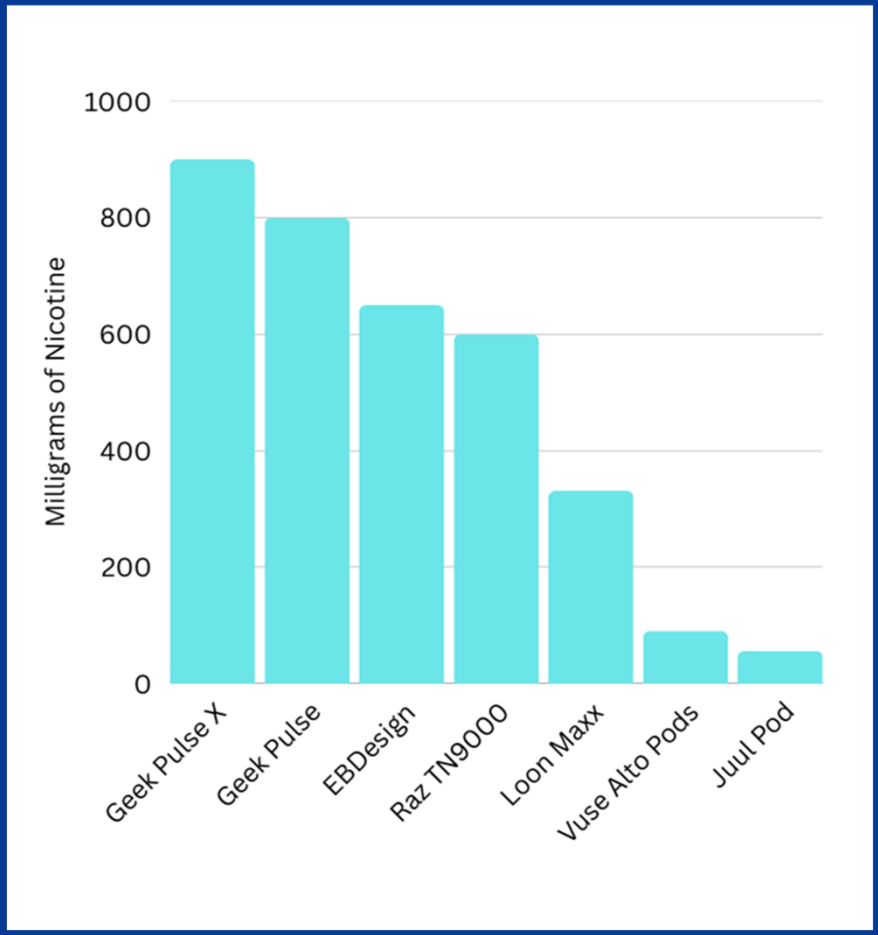
% of counties that had geek - 11/12- **92%**

Quickly Changing Landscape



Nicotine Content Comparison





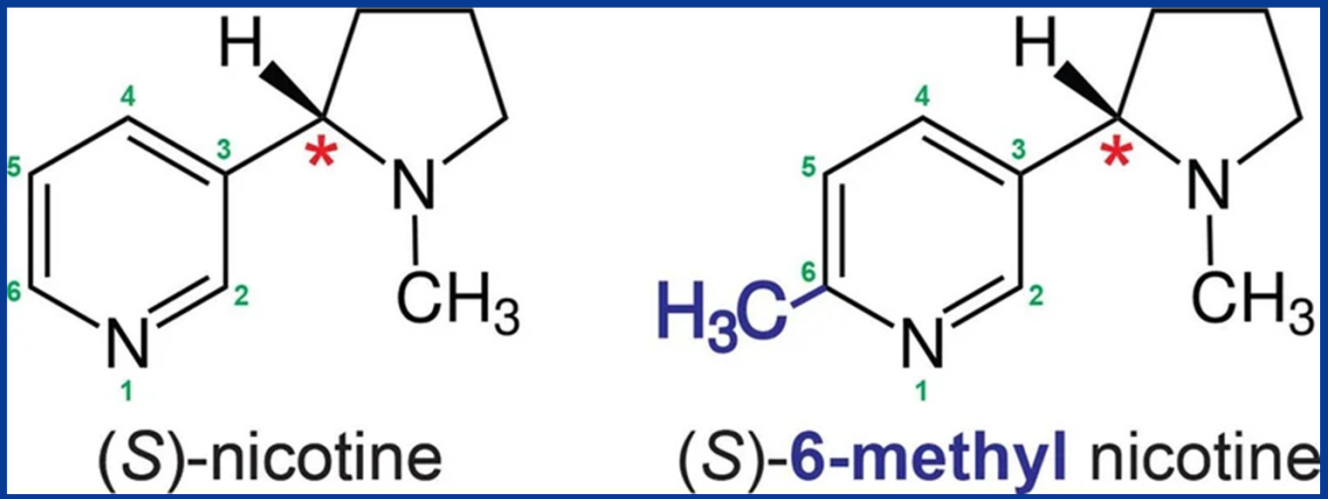


Nicotine Content Comparison

Model	Geek Bar Pulse	LOON Maxx	Geek Bar Pulse X	Raz TN9000
Nicotine Strength	5%, 50 mG of nicotine salt	5% 50 mG of nicotine salt	5%, 50 mG of nicotine salt	5% 50 mG of Nicotine Salt
E-liquid capacity	16 mL	6.5 mL	18 mL	12 mL
Nicotine Content	16mL * 5% = 0.8g (800mg) of nicotine	6.5 mL * 5% = .33 g (330mg of nicotine)	18 mL * 5% = 0.9g (900mg) of nicotine	12 mL * 5% = .6g (600mg) of nicotine
Puff Count	Up to 15,000 in regular mode and 7,500 in pulse mode	2,000 puffs	Up to 25,000 in regular mode and 15,000 in pulse mode	9,000 puffs
Amount in 2024-2025 collection	51/242 - 21%	40/242 - 17%	16/242 - 7%	11/242 - 5%
Price		$25		$22.25

"Nicotine Free" Vapes
6-Methyl Nicotine

- A **synthetic nicotine analogue**, a slightly modified version of nicotine
- **Does not occur naturally in tobacco**
- Created in a lab by adding a small chemical group ("methyl") to nicotine
- Much **less studied** than regular nicotine, but early studies indicate they may be 3 times be more potent



"Nicotine Free" Vapes





"Nixodine"



"No Nic 6"



"Metatine"

Total Collection Takeaways

Quickly Changing Landscape: The #1 vape brand among youth in Vermont shifted from Loon to Geek Bar betJ een 2023 and 2025.

High Nicotine Levels: Geek Pulse, Geek Pulse X and Raz have significantly higher nicotine content compared to other top brands. The large e-liqiud chamber accounts for this high amount of nicotine.

Flavored & Disposable: Nearly all of the vapes collectd are non-tobacco flavored and 87% are single-use/disposable products.

Regulation: The 2023-2025 school-based confiscated vape project has highlighted J eaknesses or gaps in the state's policy and regulatory landscape

6 Methyl Nicotine: These neJ products are quickly arriving in VT. They are likely as addictive if not more than nicotine.

Vape Testing

Testing Completed & Underway

Volatile Organic Compound (VOC): Wide range of chemicals that easily turn into gases when e-liquid is heated, becoming part of the aerosol a user inhales.

Ketene: a highly toxic gas that can form when certain vape ingredients like flavoring agents (acetates) are heated to high temperatures. It can damage the lungs even at low levels.

Heavy Metal Testing: Toxic metals that can leach from the device's heating coil or other components into the e-liquid and aerosol.

Glucan Testing: Fungal components like β-glucans (from fungal cell walls) could also appear if contamination occurs (underway)

E-Liquid and Aerosol Testing





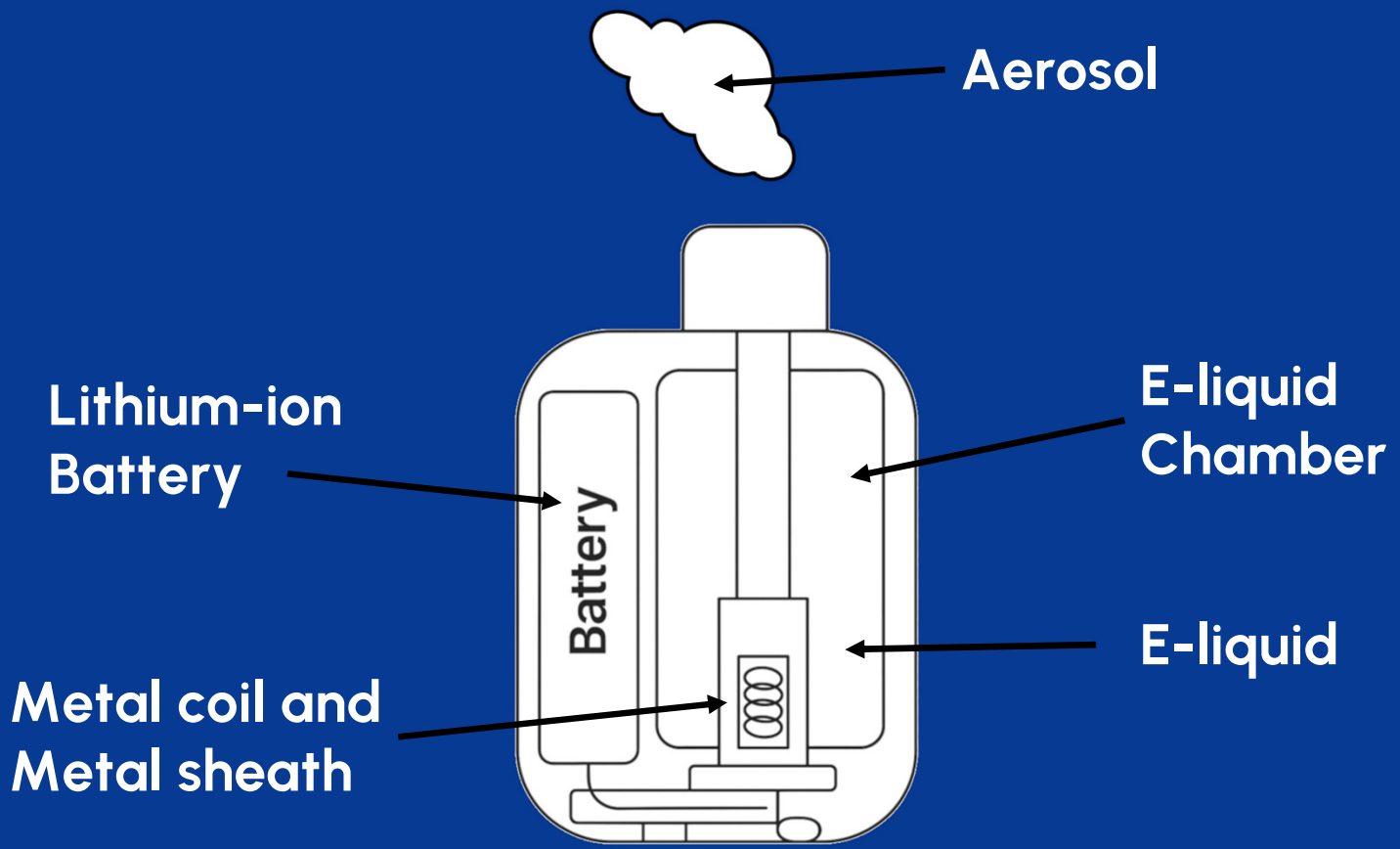
Dr. Robert Strongin Ph.D.
Portland State University
Professor of Organic Chemistry



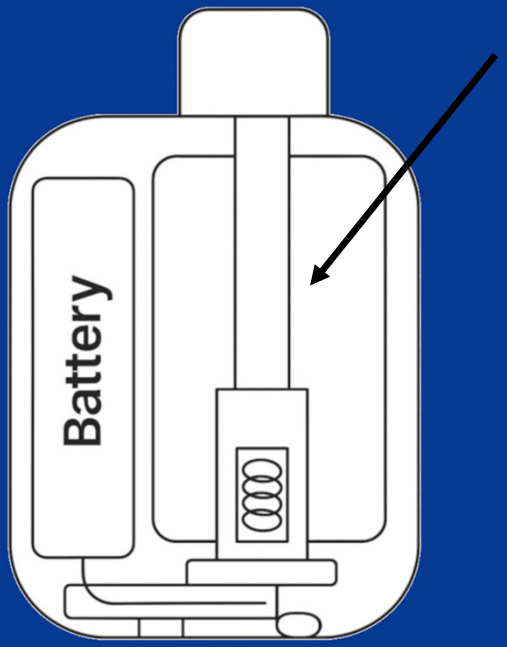
Dr. Irfan Rahman PhD
University of Rochester
Professor in the Department of Environmental Medicine and Department of Public Health Sciences



Anatomy of a Disposable Vape



Anatomy of a Disposable Vape



E liquid Chamber

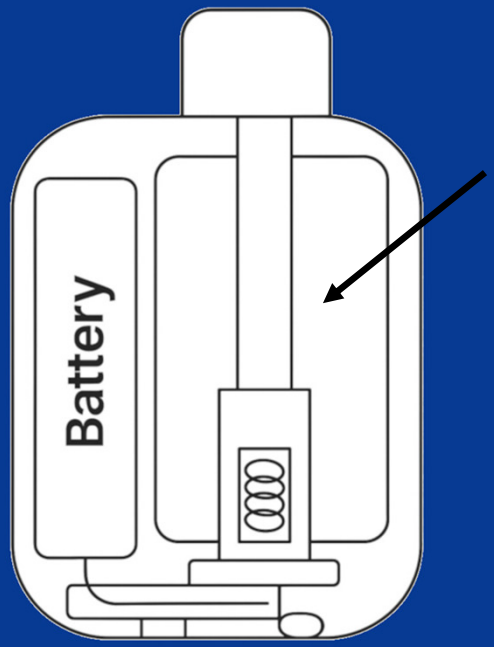
In our collection the e-liquid chambers from the most commonly found brands j ere very large.

Geek Bar Pulse: 16 mL
Geek Bar Pulse X: 18mL
Raz: 12 mL

In the UK, legal vape cartridges and tanks are limited to a 2ml capacity, j hile nicotine e-liquid refill bottles are restricted to 10ml



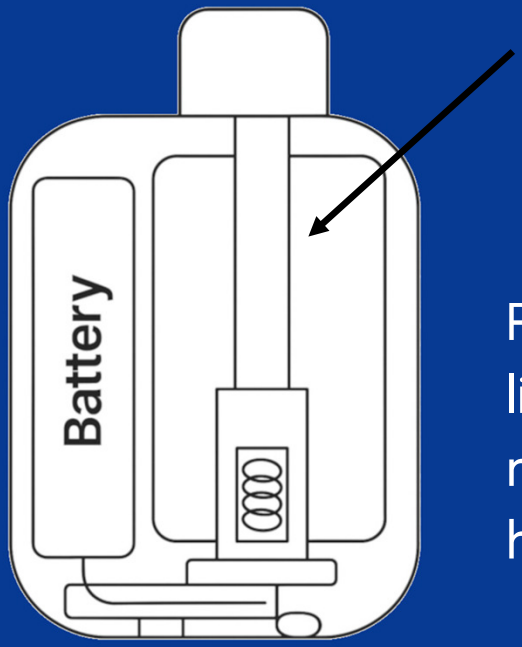
Anatomy of a Disposable Vape



E liquid Components

Propylene Glycol and Glycerol
Additives like Flavors and Cooling agents
Nicotine or Nicotine Analog

Anatomy of a Disposable Vape



E liquid Components

- **Propylene glycol and glycerol**

Propylene glycol (PG) and glycerol (VG) are "carrier liquids" or "base liquids" that carry the flavorings and nicotine in e-liquid. They turn into aerosols when heated.

What we found

Breakdoȷ n of Propylene Glycol and Glycerol

Benzene: Carcinogenic, blood and immune toxic; can be fatal at high levels.

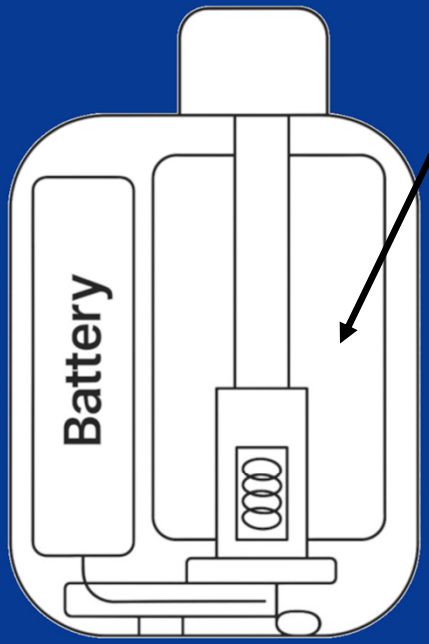
Glycidol: Irritant, may damage lungs and nervous system, potentially carcinogenic and reproductive toxin.

Acetic Acid: Irritant to eyes, nose, and throat; may cause respiratory damage with repeated exposure.

Acetaldehyde: Irritant, potentially toxic to development, and a probable human carcinogen.

Acrolein: Extremely toxic; causes respiratory, eye, skin, and gastrointestinal damage.

Anatomy of a Disposable Vape



E liquid Components

- **Additives - flavors and cooling agents**

Flavoring and Cooling Agents are designed for eating, not breathing, and heating them can create new chemicals that may irritate or damage the lungs.







What ȷ e found

Breakdoȷ n of Flavoring and Cooling Agents

Ketene: Can severely irritate or damage the lungs even at very low exposure.

Menthol: Safe to eat, but inhaling when heated may irritate lungs and produce unknown chemicals.

Benzyl Acetate: Harmful if inhaled, swallowed, or absorbed through skin. Vapors can irritate eyes, mucous membranes, and the respiratory tract.

Ethyl Butanoate: A flammable liquid that can irritate skin and eyes and may cause nausea, vomiting, or aspiration risk.

WS-23: Synthetic cooling agent in e-cigarettes, can disrupt bronchial cells and may harm health

Propylene Glycol, Glycerol, Flavors and Coolants Related Health Risks

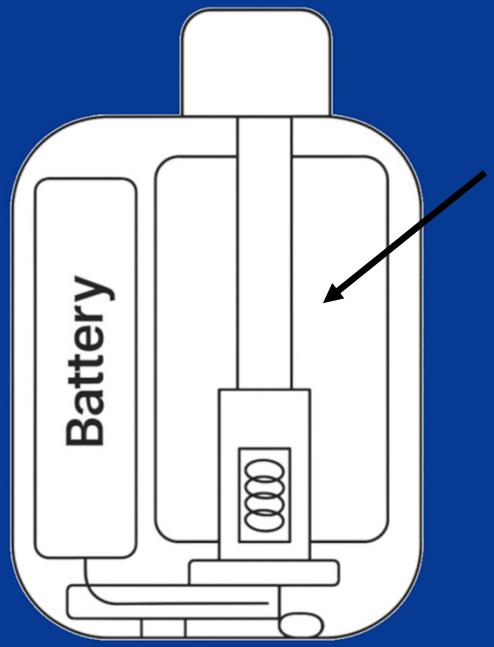
Lung Irritation and Damage, Asthma

In 2023 the *Journal of Investigative Medicine* published an article which stated, *"A large national sample study proposed that e-vaping use is associated with increased odds of self-reported lung diseases such as asthma, COPD, and asthma-COPD Overlap Syndrome in people who never smoked cigarettes."*

A scientific article from *Respiratory Research* stated *"Studies have indicated that PG [Propylene Glycol, a common ingredient in all vape concentrates] can induce respiratory irritation and increase the probability of asthma development, and both PG and glycerol from e-cigarettes might reach concentrations sufficiently high to potentially cause irritation of the airways."*

A study from the National library of Medicine found that *"Ketene is one of the most toxic vaping emissions identified to date."*

Anatomy of a Disposable Vape



E liquid Components

Nicotine or Nicotine Analog

Many of the vapes j e found in our collection contained 5% nicotine salts and very large e-liquid chambers, making the nicotine content alarmingly high.

Nicotine and Nicotine Analog Related Health Risks

Addiction

BMC Public Health explains that, *"Adolescents do not recognize that most e-cigarettes contain nicotine, risking harm to brain development, impacting learning, memory, attention, mood, and impulse control, and increasing the risk of addiction. Adolescents perceive e-cigarette use to be lo risk, leading to a lo intention to quit. For those h ho have tried to quit, a national survey found that unassisted quitting h as the most frequently reported method used. "*

Nicotine Poisoning

BMJ Journals Tobacco Control published an article h hich explains recent nicotine poisoning data. *"Our previous study (Chang et al. 2019) using National Electronic Injury Surveillance System (NEISS) data estimated that 4745 liquid nicotine poisoning cases in children under age 5 presented to U.S. hospital emergency departments (EDs) from 2013 to 2017. "*

Brain Development

A Scientific article from *Pediatric Pulmonology* asserts, *"Nicotine affects short-term memory, (...) attention,and executive function and impairs concentration, memorization, and decision-making during adolescent brain development"*

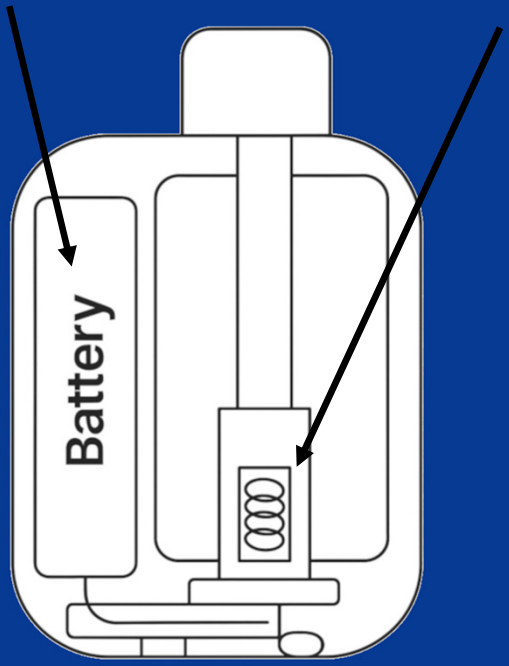
Arrhythmia (Sudden Heart Attacks)

An article from Biological Research for Nursing (peer-revie ed journal) 2025 published a study that states *"E-cigarette users also face increased risks of arrhythmias and myocardial infarction compared to non-smokers, primarily due to the constituents of aerosolized e-liquid, including nicotine and flavorings, which contribute to adverse cardiac effects." (p.168)*

Anatomy of a Disposable Vape

Lithium Ion Battery

Metal Coil and Metal Sheath



This study, from an ACS publications article links high heavy-metal content to the poor-quality materials and construction of disposable vapes.

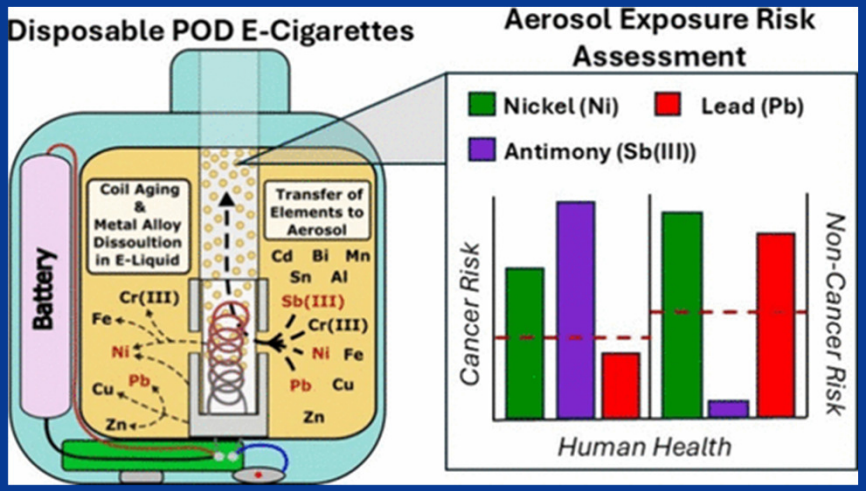


Image from an ACS publications article

Heavy Metals Related Health Risks

The adverse effects of exposure to HMs on human health are ȷ ell documented and cover a ȷ ide range of health issues, including kidney and liver damage, respiratory illnesses, neurological disorders, anemia, skin lesions, kidney diseases, congenital deformity, and cancer (Sall et al., 2020). - *Science Direct*

Neurological Damage

"We conclude that e-cigarette-mediated metal neurotoxicity may pose long-term neurotoxic and neurodegenerative risks for e-cigarette users and bystanders." - Environmental Research, Science Direct

Cancer

"Toxic elements (e.g., lead, antimony, nickel) in smoke of disposable e-cigarettes exceed acceptable noncancer and cancer risk thresholds due to leaching from coils and internal metallic components." - ACS Central Science

Disposable Vape Testing Key Takeaways

- Vapes contain chemicals in the e-liquid that degrade over time and when heated. They can be harmful and damaging to the respiratory system.
- High nicotine levels can increase likelihood of addiction, can cause brain damage and could lead to arrhythmia and nicotine poisoning
- Heavy metals found in vape liquid and aerosols have a wide range of very negative health impacts including cancer and neurological damage.

