

A young man with short dark hair, wearing a light blue button-down shirt and dark suspenders, is shown in profile, looking down and exhaling a thick cloud of white vapor from an e-cigarette. He is standing in a school hallway with wooden lockers in the background. The image is overlaid with a vibrant, multi-colored wavy graphic at the top and bottom, transitioning from red and orange on the left to green and blue on the right.

E-CIGARETTES, VAPING AND JUULING: A PUBLIC HEALTH CRISIS TARGETING MIDDLE AND HIGH SCHOOLERS

Source of Image: <https://www.flavorhookkids.org/>

- *An Industrial Hygienist Perspective*

INTRODUCTION

- ***Azza Carmona, Director of EHS @ A-Tech Consulting, Inc. & Pioneer Parent to 6th Graders Matthew and Hannah Carmona***
- Education
 - MS Industrial Health – University of Michigan
 - MPH – University of Michigan
 - BS Biology – UC Irvine
- Certifications
 - **CIH, CSP, ARM**



The Mysterious Vaping Illness That's 'Becoming an Epidemic'

A surge of severe lung ailments has baffled doctors and public health experts.

A recent sudden lung illness outbreak from vaping has affected **more than a thousand people; the youngest is 13.**

American College of Physicians

In the past year alone,
vaping among
high schoolers has increased

78%

CENTER FOR
TOBACCO
PRODUCTS



How much **do you know** about the epidemic?

“

We must take immediate action to meet the urgency behind this public health crisis — Governor Newsom

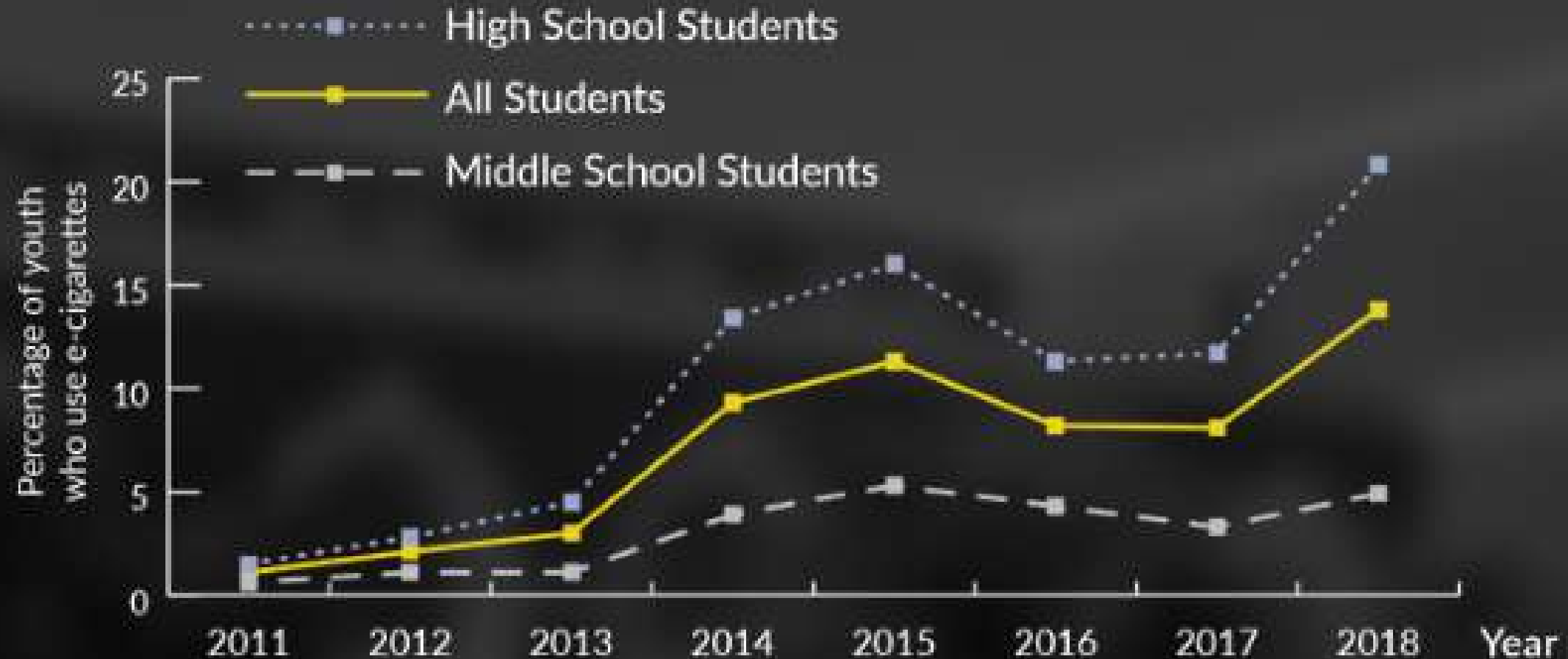
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PUBLIC HEALTH CRISIS

- During 2017 and 2018, e-cigarette use skyrocketed among youth, leading the U.S. Surgeon General to call the use of these products among youth an **epidemic** in the United States.
- The CDPH (CA Dept of Public Health) states*:
 - **Teenagers** and young adults make up almost half of the people hospitalized with breathing problems from vaping in California.

**10/15/2019 Weekly Report*

Growth in E-Cigarette Use

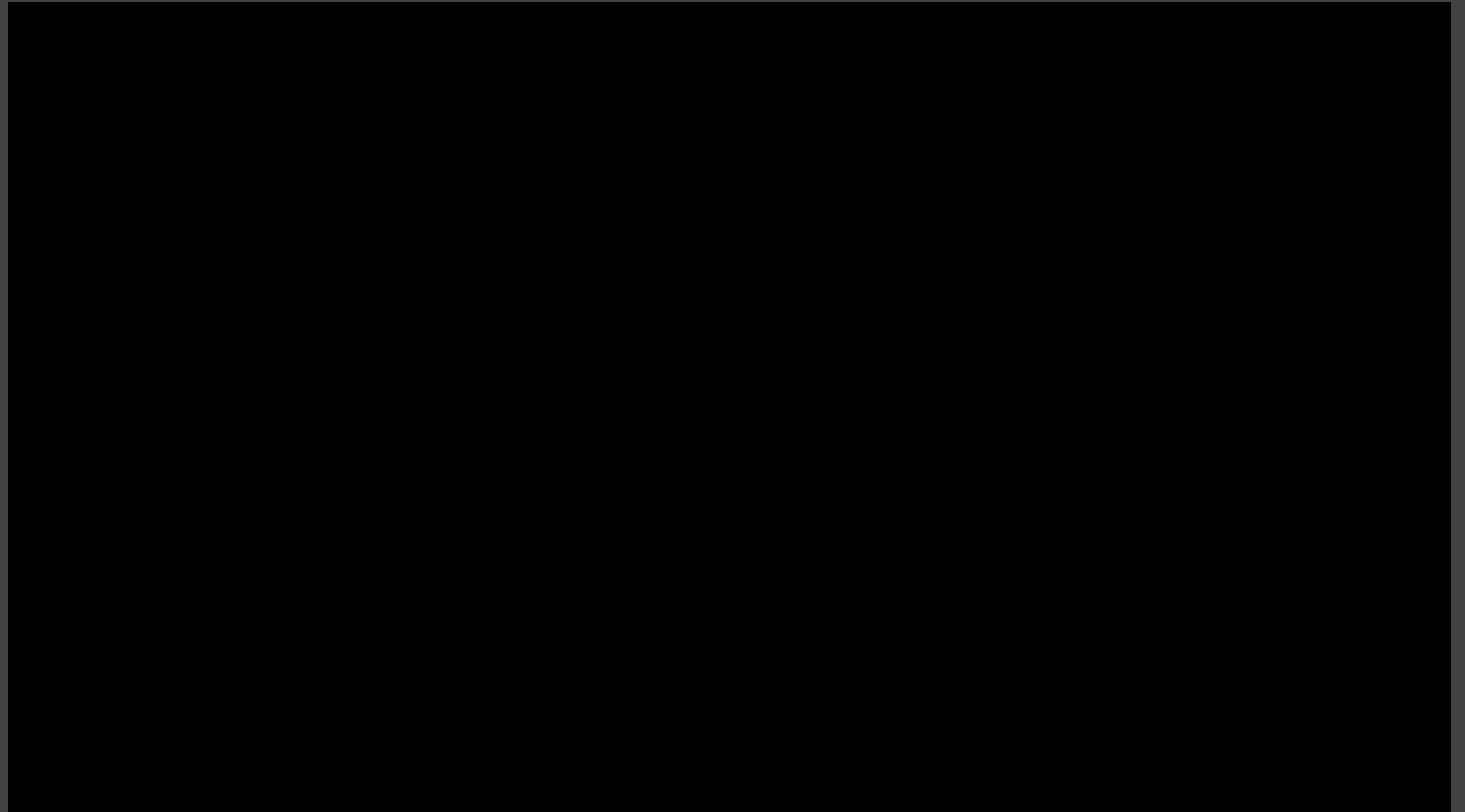


Source: National Youth Tobacco Survey 2011-2018

Notes: In 2014, changes were made to the e-cigarette measure to enhance its accuracy.



VAPING IS AN EPIDEMIC AMONG OUR TEENS:



Industrial Hygienists address:

POTENTIAL HAZARDS

Chemical Agents

Gases, vapors, solids, fibers, liquids, dusts, **mists**, fumes, etc.

Physical Agents

Noise and vibration, heat and cold, electro-magnetic fields, lighting etc.

Biological Agents

Bacteria, fungi, etc.

Ergonomic Factors

Lifting, stretching, and repetitive motion

Psychosocial Factors

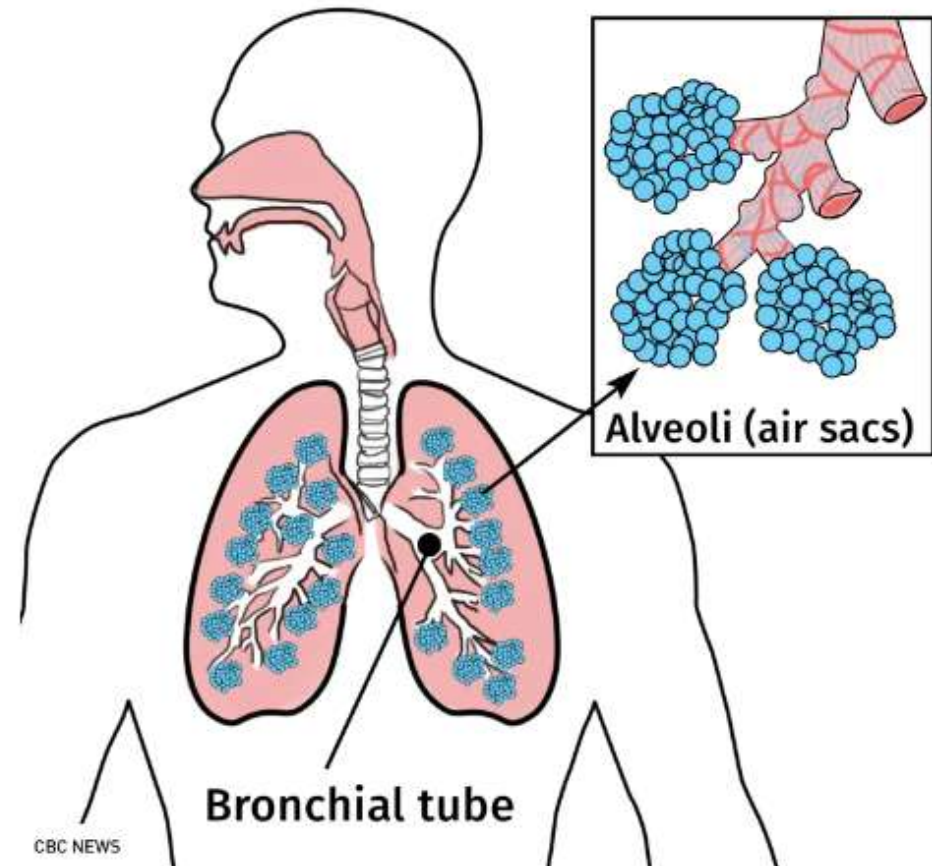
Stress, workload and work organization

WHAT IS AN AEROSOL?

- **Mists** are **liquid aerosols** formed by mechanical means.
- Aerosols are suspensions of particulates in air that can be solid or liquid. These particles can go **deep in your lung**.
- Controls to minimize exposures in the workplace capture the aerosol through ventilation or workers wear respiratory protection.

Picture Source

<https://www.cbc.ca/news/health/e-cigarette-vaping-illness-explainer-1.5280386>



The delicate alveolar sacs in the lung are meant for respiration of gases, not oils. (CBC News)

"When we inhale something that we shouldn't, like lipids [fats] that don't clear well after it's inhaled, it kind of lines the alveolar sacs that are meant for respiration," Vethanayagam said. "Over time if you're vaping on a daily, weekly basis, it can accumulate further. So death is just one aspect of the tip of the iceberg."



WHAT IS VAPING?

- Vaping is inhaling **aerosol** from an **e-cigarette** or other vaping device that heats a liquid that can contain nicotine, marijuana (THC), cannabidiol (CBD) or other substances.
- \$3 Billion Global Industry, 600 Brands, 8000 plus Flavors and liquids
- Less than a decade ago, the **e-cigarette** was an obscure product marketed as a safe, tobacco-free alternative to conventional cigarettes by a single company in China
 - Examples of other things that were deemed healthy
[//stillblowingsmoke.org/#health/museum](http://stillblowingsmoke.org/#health/museum)

VAPING DEVICES: E-CIGARETTES

- E-cigarettes can look like cigarettes, USB flash drives, pens, and other everyday items.



HOW DOES IT WORK?

- Usually a lithium-ion battery powers the atomizer
- When a user inhales, the atomizer makes contact with the battery, activating the heating element. The liquid from the cartridge is then heated and vaporized
- **The liquid cartridge can contain diethylene or propylene glycol and/or vegetable glycerin, water, flavoring, nicotine, and other unknown chemicals**

Taken from ASHRAE Journal, June 2014 "The Hazards of E-Cigarettes"

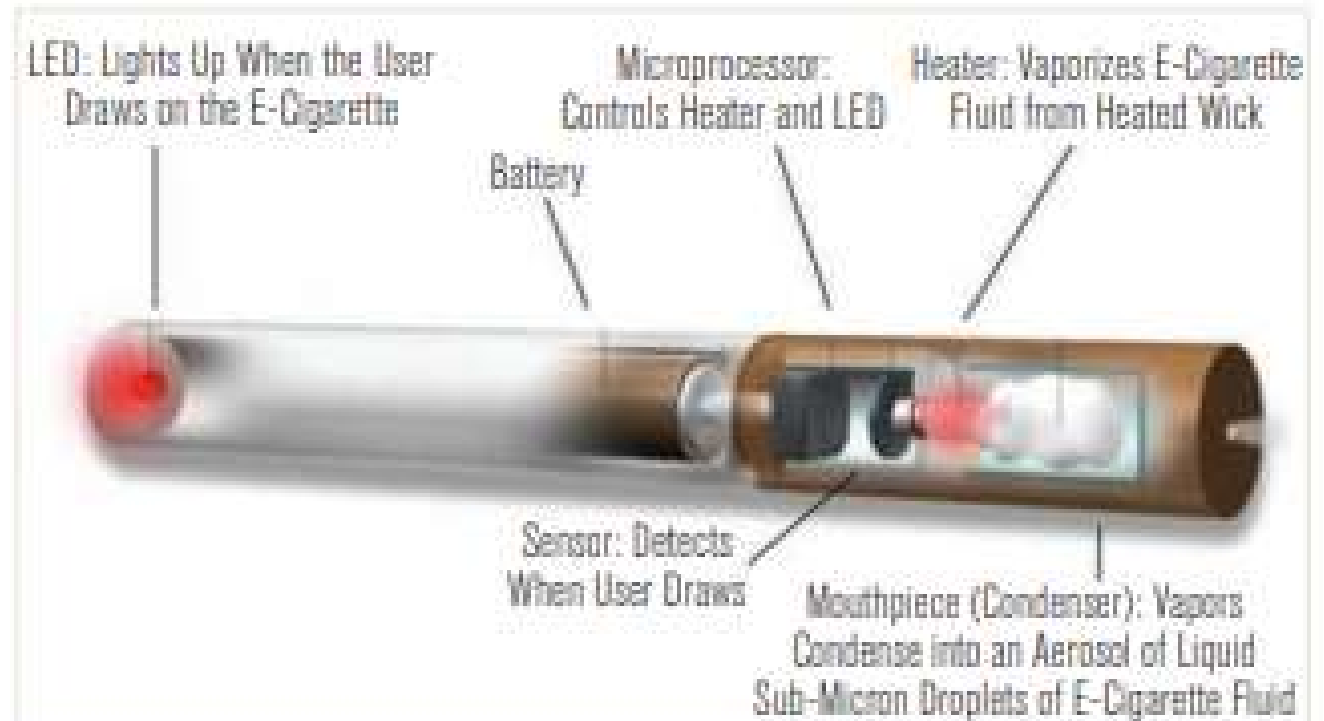


FIGURE 1: Schematic of the typical components found in an e-cigarette.





LISTEN TO OUR TEENS

POTENTIAL HAZARDS

Safety Hazards:
Defective batteries can
cause fires and
explosions resulting in
serious injuries

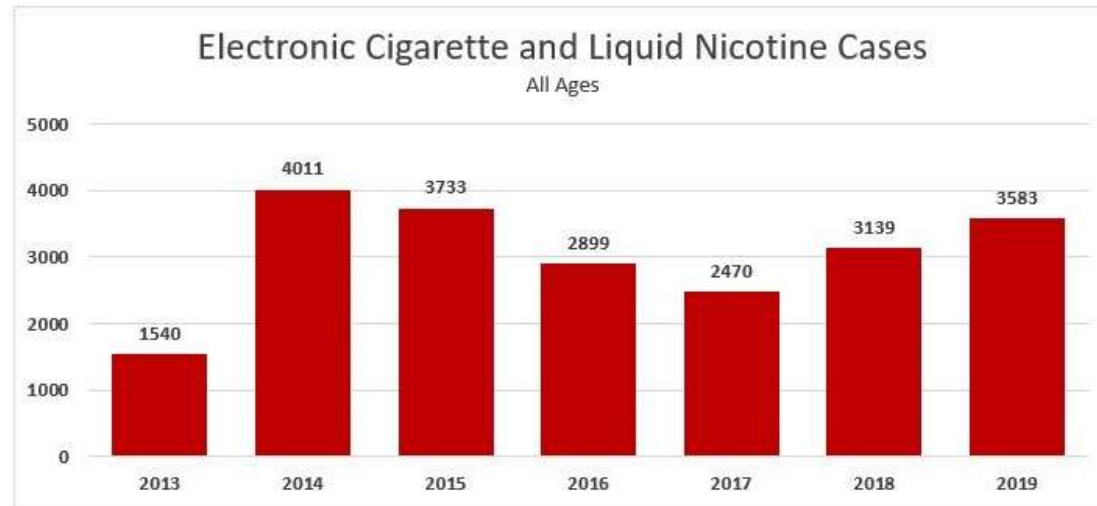


Source: CDC Know the Risks: A Youth Guide to E-Cigarettes

POTENTIAL HAZARDS

- **Poisonings** by swallowing, breathing or absorbing e-cigarette liquid through skin or eyes.
- Significant symptoms are nausea and vomiting.

Source: [American Association of Poison Control Centers](#)



POTENTIAL HAZARDS

- Nicotine harms the developing adolescent brain. The parts of the brain that control attention, learning, mood and impulse control.
 - Important growth is happening in brains until 25 years old.
- Nicotine can cause addiction.

Source: CDC Know the Risks: A Youth Guide to E-Cigarettes



It's not like you can
buy a new brain.

The human brain is the last organ to fully develop, at around age 25. Nicotine in e-cigarettes can harm brain development and lead to addiction in youth and young adults. Let's protect our kids.

Learn how at www.CDC.gov/e-cigarettes

POTENTIAL HAZARDS

- Aerosols contain at least 35 different elements including metals such as tin, silver, iron, sodium, magnesium, and potassium, and nanoparticles of tin, chromium, and nickel.
- Formaldehyde, a recognized human carcinogen, is a degradation product of propylene glycol and glycerol and has been found in the emissions of e-cigarettes.

IT'S **NOT** JUST
"HARMLESS WATER VAPOR"

E-cigarette aerosol contains
at least **10 chemicals** on
California's Prop 65 list of
chemicals known to cause
**cancer, birth defects or other
reproductive harm.**

TOLUENE
ACETALDEHYDE
BENZENE
CADMIUM
FORMALDEHYDE
ISOPRENE
LEAD
NICKEL
NICOTINE
N-NITROSONORNICOTINE



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An abstract graphic on the left side of the slide, featuring a vibrant red background with flowing, translucent green and yellow shapes that resemble smoke or liquid. A thin, dark line separates this graphic from the white text area on the right.

POTENTIAL HAZARDS

- Limited information is available on the health effects of exposure to aerosolized flavorings. A compound that may be safe when ingested is not automatically safe when inhaled as an aerosol, as has been seen with the use of diacetyl for buttery flavorings. Most flavorings in e-cigarettes have not been thoroughly studied for inhalation health effects.
- Research has shown that users do not absorb all of the nicotine and other chemicals they inhale. Therefore, secondhand exposures are clearly possible.
- Propylene glycol, found in theatrical smoke, is commonly used in e-cigarettes as a carrier for nicotine and the flavorings, and to create the “vapor” that is emitted. The literature reviewed indicates that exposure to theatrical fogs may contribute to asthma and other lung problems.
- E-cigarette exposure has also been shown to reduce bacterial and viral clearance.

An abstract graphic on the left side of the slide, featuring a vibrant red background with flowing, translucent green and yellow shapes that create a sense of movement and depth.

AIHA WHITE PAPER

- E-cigarettes should be considered a source of organic compounds and particulates in the indoor environment until they have been thoroughly evaluated for safety."

SYMPTOMS OF EXPOSURE FROM INHALATION OF AEROSOLS

- Breathing symptoms: trouble catching their breath, coughing, chest pain
- Gastrointestinal symptoms: nausea, vomiting, diarrhea, abdominal pain
- Non-specific symptoms: feeling tired, fever, weight loss
- There is **no test** that a doctor can do to know that breathing problems are from vaping right away. Laboratory blood tests and an x-ray or CT scan of the lungs may be necessary.

Be aware of the symptoms in case your middle or high school child develops symptoms, and seek medical attention.

- CDPH 10/15/2019 Weekly Report



JUUL's nicotine liquid refills are called "pods." JUUL is available in several flavors such as Cool Cucumber, Fruit Medley, Mango, and Mint.



LATEST AND GREATEST: THE JUUL

THE
JUUL!

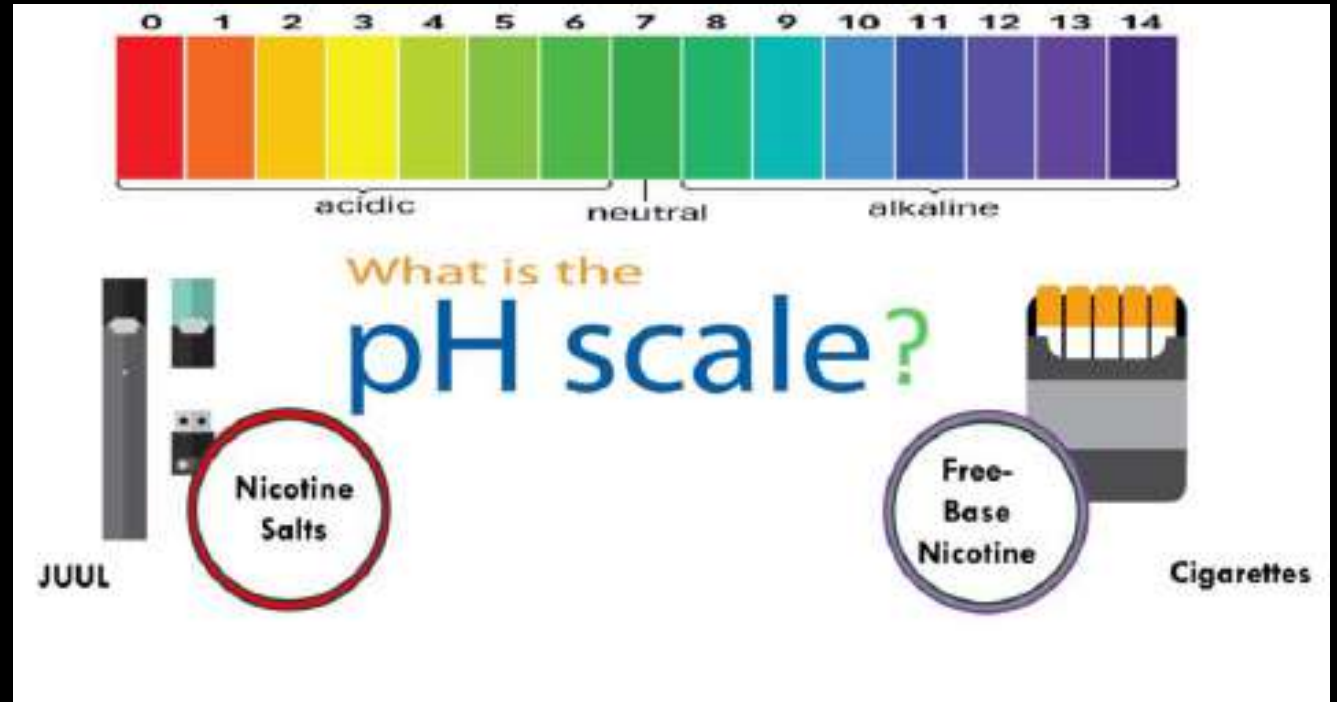




THE JUUL

- Contain high level of nicotine. According to the manufacturer, a single JUUL pod contains as much nicotine as a pack of 20 regular cigarettes.
- News outlets and social media sites report widespread use of JUUL by students in schools, including classrooms and bathrooms.
- Approximately two-thirds of JUUL users aged 15 – 24 do not know that JUUL always contains nicotine

- Manufacturer added a chemical to the nicotine, which causes it to become acidic.
- Nicotine salts are less harsh on your throat.
- This allows for nicotine to be used more easily, which increases the likelihood of trying an e-cigarette and getting hooked.



Source: CDC Know the Risks: A Youth Guide to E-Cigarettes

JUULING

- The JUUL has two components: the bottom part is the device, which includes the battery and temperature regulation system, and the top part is the e-liquid cartridge that you stick into the device
- The cartridge is also the mouthpiece, so you just click it into the JUUL and you're ready to go
- The JUUL device is rechargeable and comes with a USB charger that you can pop into your laptop or charging block.

HOW DOES IT WORK?

START WITH YOUR JUULPOD

Remove colored cap & insert cartridge end into device. Voila - it becomes your mouthpiece as well as the flavorful engine that powers JUUL.

No buttons or switches, just draw to get it going - carefully at first, it may seem strong to first-timers.



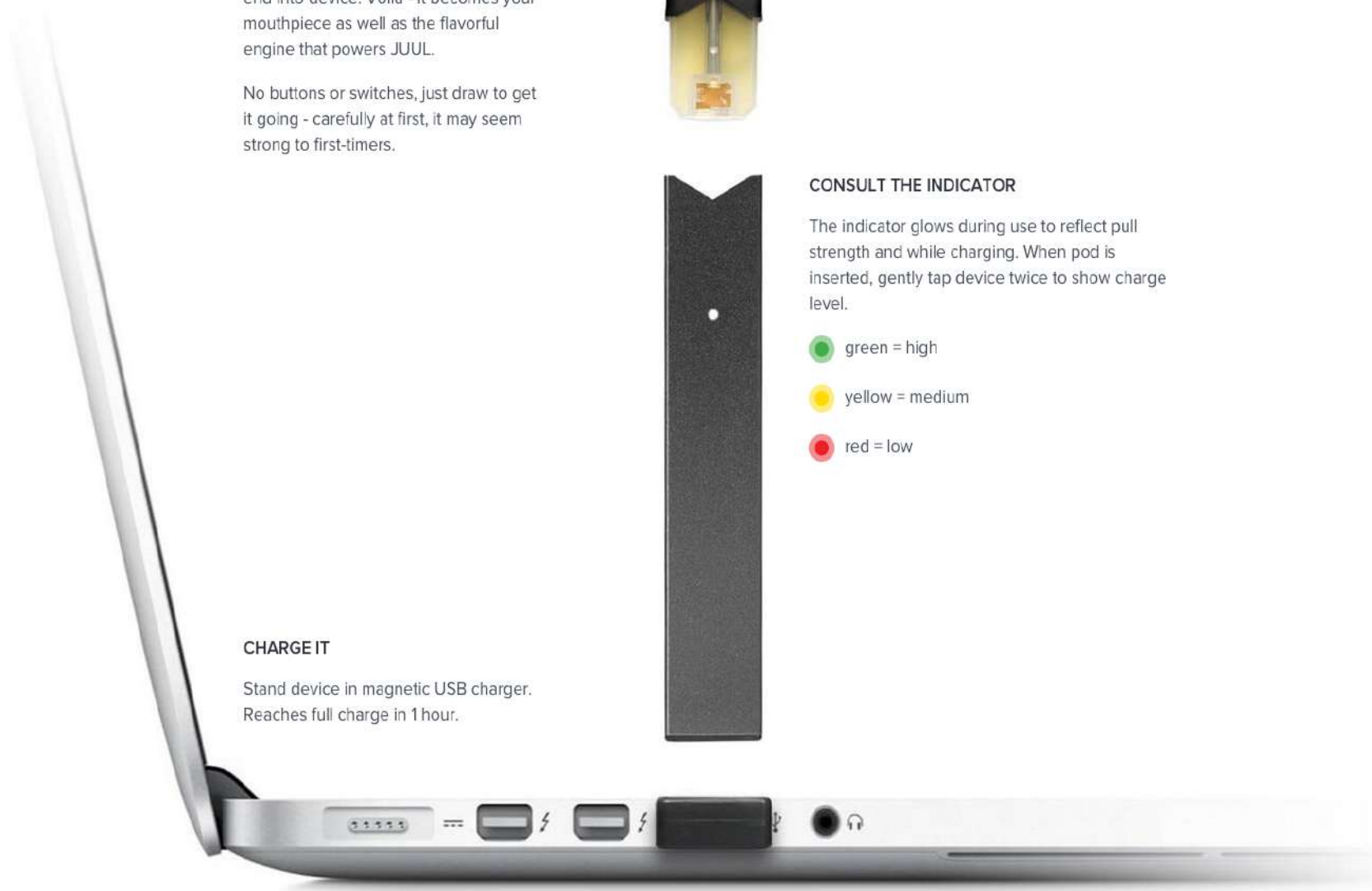
CONSULT THE INDICATOR

The indicator glows during use to reflect pull strength and while charging. When pod is inserted, gently tap device twice to show charge level.

-  green = high
-  yellow = medium
-  red = low

CHARGE IT

Stand device in magnetic USB charger. Reaches full charge in 1 hour.





E-CIGARETTE ADVERTISING IS INCREASING



Source: CDC Know the Risks: A Youth Guide to E-Cigarettes

Figure 25. A sampling of community images from #juul. While JUUL halted its own Instagram posts in November 2018, a vast community, predominantly young people continue to post to #juul it created. As of January 21, 2019, #juul has 336,308 posts.



JUUL POPULARITY IN SOCIAL MEDIA

CDPH* RECOMMENDATIONS

- CDPH urges everyone to quit vaping altogether, no matter the substance or source. For those who continue, you are urged to avoid buying any vaping products on the street and never modify a store-bought vape product.
- AVOID secondhand exposure!
- Educate your teen so that they are aware and do not start vaping.
- Resources to quit:
 - [SMOKEFREE.GOV](https://www.smokefree.gov)
 - [TEENSMOKEFREE.GOV](https://www.teensmokefree.gov)

* *California Department of Public Health*

AIHA* RECOMMENDATION'S

AIHA Electronic Cigarettes and the IH white paper offers four recommendations.

1. E-cigarettes should be considered a source of aerosols, volatile organic compounds, and particulates in the indoor environment that have not been thoroughly characterized or evaluated for health risk or safety.
2. Additional research should be conducted on the health effects from inhaling e-cigarette flavorings and other ingredients; the effects of secondhand emissions, thirdhand exposures, e-cigarettes, and nicotine addiction; and the lifecycle and end-of-use issues associated with e-cigarette manufacturing, use, and disposal.
3. The health risks and economic consequences of accidental exposure by children, adults, and pets should be addressed, including requirements for proper labeling and child-resistant packaging.
4. E-cigarettes are a potential source of pollutants. Therefore, it is prudent to manage and control vaping in indoor environments consistent with current smoking policies until and unless research demonstrates that these devices will not significantly increase the risk of adverse health effects to occupants.

* AIHA = American Industrial Hygiene Association

ARE STUDENTS JULLING IN YOUR CLASSROOM?



3:58 minutes

IS MY KID VAPING? Know the Signs

- Are there sweet or fruity smells coming from behind closed doors? That might actually be nicotine hiding in vape flavors.
 - Are there school supplies or tech products you don't recognize in kids' backpacks or rooms? How about small vials or eye dropper bottles?
 - Have you come across unfamiliar chargers, coils, or batteries?
 - Have there been changes in your kids' behavior such as increased mood swings, irritability, anxiety, or impulsivity?
 - Are your kids suffering from more frequent headaches or nausea?
-
- [Taken from Flavor Hook Kids Powered by Tobacco Free California](#)

WHERE ARE KIDS GETTING IT FROM?

- Vape products are all over social media, and many promote the sale of their products right from their accounts.
- Website age gates are easily bypassed, and kids use a parent's name for shipping. In fact, kids successfully buy e-cigs online 94% of the time.*
- Clerks at tobacco shops, vape stores, gas stations and convenience stores might not enforce the California Tobacco 21 law, which prohibits the sale of tobacco products to anyone under 21 years of age.
- Many vape companies have names that wouldn't raise a red flag on parents' credit card statements.
- Online orders can be delivered to Amazon lockers in supermarkets or convenience stores.
- Orders can also be shipped to the homes where parent(s) are at work when the mail comes.
- Kids are buying and selling pods, and even single hits, in schools.
- [Taken from Flavor Hook Kids Powered by Tobacco Free California](#)

RESOURCES

- [Tobacco Free CA](#)
- [How to Stop Vaping Guide](#)
- [CA State Officer's Report on E-Cigarettes](#)
- <https://stillblowingsmoke.org/#kids>
- [CDC Presentation for Youth: A Guide to E-Cigarettes](#)
- [Whatsinavape](#)
- [CDC Infographic on E-Cigarettes](#)
- [CDPH: Vaping Related Lung Illness: A Summary of the Public Health Risks and Recommendations for the Public](#)
- [E-Cigarettes,surgeongeneral.gov](https://www.surgeongeneral.gov/e-cigarettes)
- [Flavor Hook Kids: Powered by Tobacco Free California](#)
- [Surgeon General's Report: E-Cigarette Among Youth and Young Adults](#)
- [Scholastic "The Real Cost of Vaping" for Teachers](#)
- [ASHRAE Article The Hazards of E-Cigarettes](#)
- [Scholastic Infographic](#)

JUULERS AGAINST JUUL



6:28 minutes

ELECTRONIC CIGARETTES AND VAPING



4:38 minutes