The Chemicals In E-Cigarette Aerosol

E-cigarette aerosol is not harmless – it can contain nicotine, toxic chemicals, carcinogens, and ultrafine particles that may pose health risks. Some of the chemicals identified in e-cigarette aerosol include:

- **Nicotine**[1] – Highly addictive and can harm adolescent brain development.
- **Carbonyl Compounds (i.e., formaldehyde**[2]**, acetaldehyde**[3]**, acrolein**[4]**)** – Known toxic and irritating properties.
- **Volatile Organic Compounds**[5] **(VOCs) (i.e., benzene**[6]**, toluene**[7]**)** – Combustion-related byproducts that can cause harm to the body, especially in high doses.
- **Heavy Metals**[8] **(i.e., nickel, lead, chromium)** – Inhalation may lead to organ damage.
- **Ultrafine Particles**[9] – Can penetrate deep into the lungs, leading to inflammation and respiratory issues.
- **Tobacco-Specific Nitrosamines**[10] **(TSNAs)** – Known carcinogens found in many e-cigarette aerosols (however not at levels found in conventional cigarettes).

The contents and levels of chemicals in e-cigarette aerosol can vary widely depending on the ingredients in the e-liquid, device characteristics (i.e., battery power, wick construction), and use patterns.

Even though e-cigarettes generally have fewer toxins than conventional cigarettes,[11] researchers are continuing to learn more about the complex mixture of chemicals. For instance, researchers at Johns Hopkins University detected approximately 2,000 chemicals in four e-cigarette brands.[12] The vast majority of these chemicals were unidentified. Another recent study found some popular, newer disposable e-cigarettes released higher amounts of some toxic metals than older e-cigarettes and conventional cigarettes.[13]

Many substances in e-cigarette aerosol are toxic and under-researched. Further research on the long-term effects of exposure to e-cigarette aerosol is crucial to public health.

Campaign for Tobacco-Free Kids, August 14, 2025

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