Supplemental Information

Chemical Composition of Electronic Vaping Products Confiscated by California School Administrators or Found on School Grounds

Ping Wang, PhD[1*], Rebecca J. Williams, DrPH, MPH[2], Wenhao Chen, PhD[1], Flavia Wang[1], Mays Shamout, MD, MPH[3,4], Lauren J. Tanz, ScD, MSPH[4], Carolyn Herzig, PhD, MS[4], Lisa P. Oakley, PhD, MPH[4], Corey M. Peak, ScD, MS[4], Amy Heinzerling, MD, MPH[4], Maeh Al-Shawaf, MPH[3], Paul Melstrom, PhD[3], Kristy Marynak, MPP[3], Michael A. Tynan, MPH[3], Israel T. Agaku, DMD, PhD[3], Kazukiyo Kumagai, PhD[1]

1. Air Quality Section, California Department of Public Health, Richmond, CA, USA
2. California Tobacco Control Program, California Department of Public Health, Sacramento, CA, USA
3. Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia, USA
4. Epidemic Intelligence Service, Division of Scientific Education and Professional Development, Center for Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention, Atlanta, GA, USA.
5. Occupational Health Branch, California Department of Public Health, Richmond, CA, USA

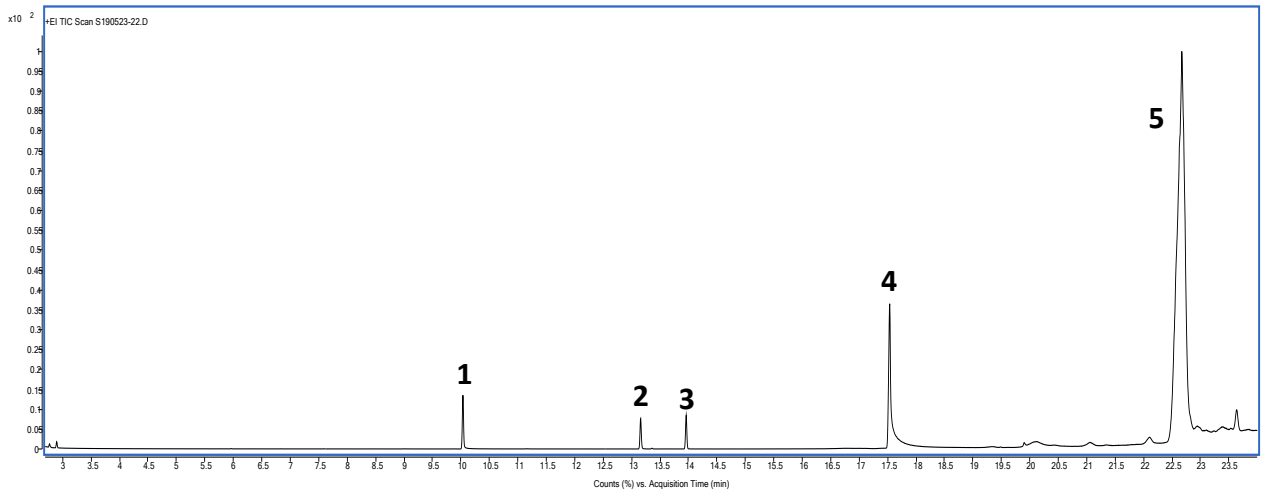
[*]Corresponding Author:

Ping Wang, PhD, Air Quality Section, California Department of Public Health, Richmond, CA 94804, USA; Telephone: 510-620-2900; E-mail: ping.wang@cdph.ca.gov

S1 Protocols for e-liquid retrieval from original devices

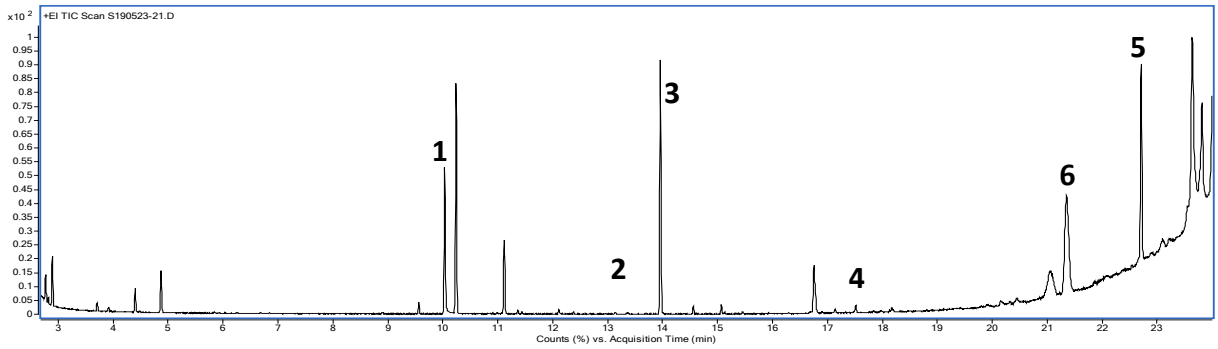
The cartridges and bottles collected from schools were opened either by hand or with the aid of tools as needed (i.e., pliers) and the e-liquids were extracted. For the pods, they were either disposable (such as Juul) or refillable (such as Suorin and SMOK). There were rubber plugs or covers on the pods that could be lifted or removed to reach the e-liquid directly or through the fill ports. A disposable glass pipet was used to retrieve the e-liquid in the pod which was then put into a 2mL amber vial for later gas chromatography/mass spectrometry (GC/MS) analysis. For the mods, the top section could be swung opened and there was a fill port opening to retrieve the e-liquid. For the vape pen cartridges, the top covers could be removed and the e-liquid inside the tank was retrieved using a glass disposable pipet. For some of the vape pen samples which were too viscous and could not be removed by pipetting, the opened end of cartridge was first placed face down in a 5mL syringe barrel, which was then put into a 15mL centrifuge tube and centrifuged to spin out the sample and collect into the centrifuge tube for later use. For the e-liquid bottles, most of them came as plastic dropper bottles. The cap was removed, and e-liquid squeezed out to store in a 2-ml vials for GC/MS analysis. All the e-liquid retrieved from different cartridges were stored in individual 2-mL amber vials for later use.

S2 An example GC/MS chromatogram of vape pen sample containing both nicotine and tetrahydrocannabinols (THC)



1. Propylene glycol (PG); 2. Nicotine; 3. Quinoline (added internal standard for instrument calibration); 4. Vegetable glycerin (VG); 5. Tetrahydrocannabinol (THC).

S3 An example GC/MS chromatogram of vape pen sample containing cannabidiol (CBD) and tetrahydrocannabinol (THC)



1. Propylene glycol (PG); 2. Nicotine; 3. Quinoline (added internal standard for instrument calibration); 4. Vegetable glycerin (VG); 5. Tetrahydrocannabinol (THC); 6. Cannabidiol (CBD).

Table S4 GC/MS method validation showing retention time (RT), linearity (R^2), method of detection limit (MDL), limit of quantitation (LOQ), intermediate precision (RSD%, n=7), recovery%, and the ions (qualifier and quantifier) used for identification/quantification of nicotine, VG, PG, quinoline (added internal standard). E-liquid samples were diluted with isopropanol at 1000 times before analysis. The recovery was calculated based on the average of 24 samples spiked with PG, VG, and Nicotine at 550, 550, 50 mg/mL respectively.

Compound	RT min	R^2	RSD%	MDL mg/mL	LOQ mg/mL	Recovery %	Quantifier ion	Qualifier ion	Calibration curve equation	Calibration range μg/mL
Quinoline	13.940						102	129, 161		10
PG	10.050	0.9889	5.0	7.4	23.7	108.8 ± 4.4	45	43, 61	Y=0.1365X+0.8621	20 ~ 1200
Nicotine	13.131	0.9998	3.8	0.3	0.8	94.4 ± 1.9	133	84, 162	Y=0.5429X+0.0115	1 ~ 60
VG	17.528	0.9992	3.2	4.1	13.1	95.4 ± 5.6	61	43, 74	Y=0.0854X-0.3155	20 ~ 1200