

# The Relationship Between PG/VG and Other Liquid Characteristics Among Adults Frequently Using Refillable ENDS

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## Background

The relationship between propylene glycol (PG) and vegetable glycerin (VG) ratio and other electronic nicotine delivery system (ENDS) liquid characteristics is understudied—representing an opportunity to help regulators better understand how liquid attributes potentially influence ENDS abuse liability/toxicant exposure.

## Methods

- 1,219 U.S. adults (21+) who frequently (5+ days/week) use ENDS participated in Wave 3 of the Vaping and Patterns of E-cigarette Use Research (VAPER) Study between Sep–Nov 2021. 56.3% (n=686) of participants used an ENDS device that could be refilled from a bottle of liquid and were included in the analyses.
- Participants self-reported and submitted photos of their most-used ENDS device and liquid. Data from photos were prioritized to obtain liquid nicotine concentration (mg/mL), primary flavor, and PG/VG % composition information.
- Data were analyzed descriptively and compared using Kendall correlation, Kruskal-Wallis, and Mann-Whitney U tests.

Refillable ENDS liquids with a **lower percentage of propylene glycol** were **more likely** to be **sweet-flavored** than menthol/mint and tended to have a **lower nicotine concentration**.



Learn more about the Vaping and Patterns of E-Cigarette Use Research (VAPER) Study

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## Results

- Among participants using refillable ENDS, 57.3% used liquid containing 30% PG, 24.6% used liquid containing 50% PG; the remaining 18.1% used other levels of PG (PG%<30:8.0%, 30<PG%<50:8.7%, PG%>50:1.3%).
- Primary flavor was associated with PG% (Kruskal-Wallis  $\chi^2=18.8$ ,  $p<0.001$ ), with menthol/mint liquids containing a significantly higher PG% than sweet liquids (median: 50% vs. 30%;  $p<0.001$ ).
- Nicotine concentration was positively correlated with PG% ( $\tau\text{-}b=0.52$ ;  $p<0.001$ ).

## Conclusions

- Adults frequently using refillable ENDS device typically used liquid containing 30% or 50% PG.
- These results suggest that liquid nicotine concentration and flavor are associated with PG/VG composition and can inform regulators about the composition of liquids used by adults frequently using refillable ENDS device.
- All these characteristics seem to co-vary, which is important to consider if any of the characteristics will be subject to product standards.

## Authors

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