Reported Compounds in E-cigarette Liquids: A 2010–2025 Review

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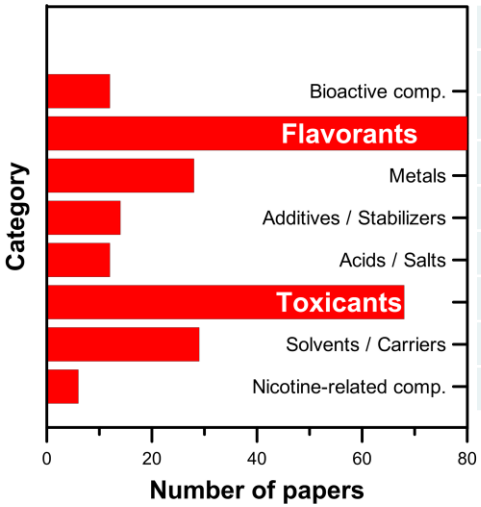
Introduction

E-cigarette liquids (e-liquids) contain nicotine, solvents (such as propylene glycol and glycerol) and several flavoring and additive compounds [1–3].
Their composition varies widely among brands and formulations, influencing nicotine delivery, labeling accuracy, and toxicological profiles [4,5].
This bibliometric study analyzes **108 peer-reviewed publications (2010–2025)** to identify the **chemical constituents** and **analytical techniques** reported for e-liquids.

Methodology

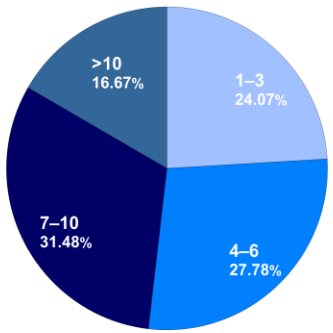
Database: Scopus
Date of search: June 19, 2025
Period covered: 2010– 19/06/2025
Language: English
Search strategy:
Keywords combined variations of *"e-cigarette"* terminology (*"vape"*, *"pod/mod device"*, *"puff"*, *"electronic nicotine delivery system"*) with composition-related terms (*content, formulation, propylene glycol, glycerol, water*).
Screening results (PRISMA-based):
3,198 records → 401 relevant → **108 included**
Data extracted:
compounds · analytical methods · affiliations · funding

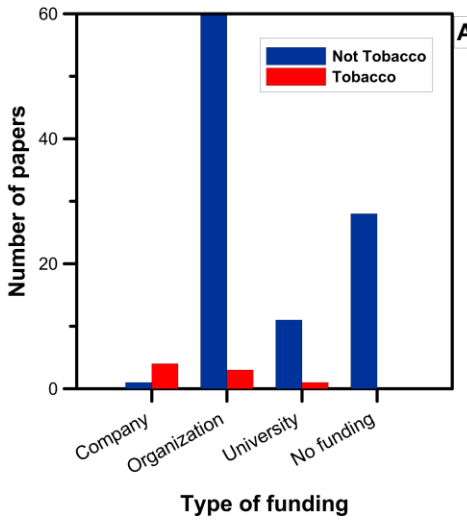
Results



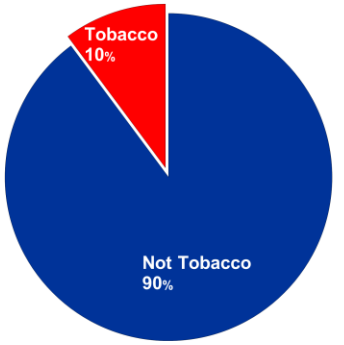
(No. of compounds) examples	Main analytical technique(s)
(24) cannabidiol, THC, caffeine	**GC–MS, LC–MS**
(208) vanillin, menthol, ethyl maltol	**GC–QTOF**
(36) Ni, Pb, Cd, Cr	**ICP–MS**
(14) triacetin, vitamin E acetate	**GC–QTOF**
(10) benzoic acid, lactic acid	**HPLC–DAD**
(75) formaldehyde, acrolein, PAHs	**GC–MS**
(16) propylene glycol, glycerol, ethanol	**HS-SPME GC–MS**
(11) nicotine, cotinine	**HPLC**

Number of authors in the 108 studies





Affiliation type of the 108 studies



Conclusions

- **401 unique compounds** were identified across **108 studies (2010–2025)**, encompassing **eight functional categories** using recognized scientific databases (MeSH, ChEBI, KEGG, PubChem).
- The results show **large variability** among e-liquids and **frequent detection of harmful substances**.
- Analysis of **affiliations and funding** revealed **limited tobacco-industry involvement**, indicating mainly **independent research** and underscoring the need for **standardized, transparent analytical methods** in future studies.

Bibliography

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