Grapefruit

Karen Pendergrass · Heavy Metal Index, Institute of Contaminant Standards

HEAVY METAL INDEX · INGREDIENT PROFILE October 2026

DOI 10.83376/hmi.ingredient.grapefruit

CITE AS

Pendergrass, K. (2026). Grapefruit. Heavy Metal Index. https://doi.org/10.83376/hmi.ingredient.grapefruit

CORRESPONDENCE

Corrections are logged publicly on the article page, each with its date, the affected value, and the source that resolved it.

KEYWORDS

heavy metals, food safety, dietary exposure

PUBLICATION HISTORY

This revision 2026-10-22.

Abstract

Grapefruit in the HMI library has 60 reported results for lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium and V from 8 sources. WHO gems/food submissions reported lead in grapefruit as sold from 566 results in 3 reporting regions, with subgroup medians from 1.3 to 320 µg/kg. In the US Total Diet Study, grapefruit as sold had a median lead result below 4 µg/kg across 27 composites from 2017-2020.

1 | Grapefruit overview

Across 2 other studies of ordinary farms and markets, reported lead means and medians with the basis not stated ranged from 3 µg/kg (Centre for Food Safety (Hong Kong) 2013) to 30.1 µg/kg (Czech et al. 2021).[5,6] For cadmium, 2 studies with the basis not stated reported means and medians from 0.15 µg/kg (Czech et al. 2021) to 2.2 µg/kg (Joint FAO/WHO Expert Committee on Food Additives 2022).[6,7]

For a buyer the practical points are the form bought, the basis a result is reported on, where the grapefruit came from and the laboratory's reporting limit. Testing finds contamination but does not remove it.

2 | What counts as grapefruit

This page covers grapefruit as sold (60 results).[1,2,3,4,5,6] Foods made from grapefruit that have their own pages, such as grapefruit juice, are covered there.

Results stay on the basis each source reports: as sold or fresh weight, dry weight, or unstated. Dry-weight, as-sold and unstated results are never pooled, and no moisture conversion is applied.

3 | How metals reach grapefruit

No study in the library compared grapefruit from contaminated and ordinary settings, so the routes by which metals reach it are not measured here.

4 | Which forms and regions measured lower

The hmi reference for lead in grapefruit as sold pools 69 subgroup units from 3 sampling families, with a median of below 4 µg/kg and a middle half spanning below 4 (lower quartile) and below 5 µg/kg (upper quartile).[1,2,3] for cadmium in grapefruit as sold, the reference median was below 1 µg/kg, with a middle half from below 1 to below 1 µg/kg across 67 units.[1,2,3] for total arsenic in grapefruit as sold, the reference median was below 3 µg/kg, with a middle half from below 3 to below 10 µg/kg across 37 units.[1,2]

Among GEMS/Food reporting regions, grapefruit as sold had the lowest lead subgroup median in PAHO (1.3 µg/kg) and the highest in EURO (320 µg/kg); reporting regions are markets, not growing areas.[1]

In one study, lead across 9 groups of grapefruit ranged from 10.1 µg/kg (white (yellow) grapefruit, Duncan cultivar, turkey-origin, pulp) to 30.1 µg/kg (red grapefruit, Star Ruby cultivar, turkey-origin, peel (P)); the lowest is the lowest observed in that study, not an established sourcing preference.[6]

5 | Processing, cooking and preparation

No processing study for metals in this food is in the library yet.

6 | Mitigation for grapefruit

Lot testing against the applicable limit is the check that can be verified.

7 | Trade-offs and limits of controls

Metals do not move together, so a lot that passes a lead limit says little about cadmium, arsenic or nickel unless those are tested as well.

8 | Testing grapefruit for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 1 µg/kg (WHO GEMS/Food) to 3,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1] Reporting limits for cadmium ranged from 1 µg/kg (WHO GEMS/Food) to 1,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1] Reporting limits for total arsenic ranged from 3 µg/kg (FDA Total Diet Study) to 100 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,2]

A useful lot result names the form, the basis and a quantification limit well below the limit that applies.

9 | Buying and verifying grapefruit

No maximum level for metals in grapefruit was verified from primary text for this page; buyers should confirm the limit that applies in the destination market.

10 | Exposure from grapefruit

No source in the library converted grapefruit concentrations into a verified estimate of intake for a defined population. Concentrations describe the food, not individual risk.

11 | Evidence review and remaining gaps

Every source record that names grapefruit was decided on its content: 8 occurrence extracted, 8 records in all. The occurrence table renders every extracted result; held values remain visible with their reason.

References identify the sources used in these answers. The Sources index preserves additional discovery links; inclusion there does not mean a source has been reviewed for this assessment. Corrections, completed searches, new direct evidence and changes in requirements should reopen the relevant answer.

12 | Grapefruit FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium and V in grapefruit, most often lead, cadmium and total arsenic.[1,2,3,4] WHO gems/food submissions reported lead in grapefruit as sold from 566 results in 3 reporting regions, with subgroup medians from 1.3 to 320 µg/kg.[1]

Among GEMS/Food reporting regions, grapefruit as sold had the lowest lead subgroup median in PAHO (1.3 µg/kg) and the highest in EURO (320 µg/kg); reporting regions are markets, not growing areas.[1]

Inorganic arsenic, the more toxic form, was measured in 4 results from 2 sources, far fewer than total arsenic.[1,8] Centre for Food Safety FEHD HKSAR 2012 reported inorganic arsenic at 2 µg/kg (mean) in grapefruit as sold from all samples (4 sampling occasions, composites).[8]

References

[1] GEMS/Food Contaminants database heavy-metal exports
World Health Organization · GEMS/Food Contamination Monitoring and Assessment Programme · 2026 · extranet.who.int
DATASET

[2] FY2018-FY2020 TDS Elements Analytical Results
U.S. Food and Drug Administration · FDA Total Diet Study · 2022 · www.fda.gov
DATASET

[3] Infants' and young children's dietary exposures to lead and cadmium: FDA total diet study 2018-2020
Spungen JH and et al. · Food Additives & Contaminants: Part A · 2024 · doi.org/10.1080/19440049.2024.2396910
PEER-REVIEWED

[4] Lead Levels in the Most Consumed Mexican Foods: First Monitoring Effort
Cantoral A, Betanzos-Robledo L, Collado-López S, García-Martínez BA, Lamadrid-Figueroa H, Mariscal-Moreno RM, et al. · Toxics · 2024 · doi.org/10.3390/toxics12050318
PEER-REVIEWED

[5] The First Hong Kong Total Diet Study: Metallic Contaminants
Centre for Food Safety (Hong Kong) · Centre for Food Safety, Food and Environmental Hygiene Department, Government of the Hong Kong Special Administrative Region · 2013 · www.cfs.gov.hk
GOVERNMENT

[6] Bioactive Substances, Heavy Metals, and Antioxidant Activity in Whole Fruit, Peel, and Pulp of Citrus Fruits
Czech A, Malik A, Sosnowska B, and Domaradzki P · International Journal of Food Science · 2021 · doi.org/10.1155/2021/6662259
PEER-REVIEWED

[7] Cadmium: dietary exposure assessment
Joint FAO/WHO Expert Committee on Food Additives · WHO Food Additives Series, No. 82 (Safety evaluation of certain contaminants in food, prepared by the 91st meeting of JECFA) · 2022 · www.who.int
GOVERNMENT

[8] The First Hong Kong Total Diet Study: Inorganic Arsenic
Centre for Food Safety FEHD HKSAR · Centre for Food Safety, Food and Environmental Hygiene Department, Government of the Hong Kong Special Administrative Region · 2012 · www.cfs.gov.hk
GOVERNMENT

STATUS AND LICENCE

Editorially reviewed in-house; no external peer review has been completed on this ingredient profile. Published as an institutional technical report with its review state tracked on the article page. Released under CC BY 4.0.

COMPETING INTERESTS

The Heavy Metal Index reports what the peer-reviewed and regulatory literature supports. It is operated separately from any certification program, does not evaluate or endorse brands, and does not use certification thresholds as evidence for the statements made here.

DATA AVAILABILITY

Every source behind this ingredient profile is listed with its own source record at https://heavymetalindex.com/ingredients/grapefruit#sources.

PUBLICATION HISTORY

This revision 2026-10-22. The full dated record is maintained at https://heavymetalindex.com/ingredients/grapefruit.