CHEMICALS IN PLASTICS: WHAT THE DATA SHOWS

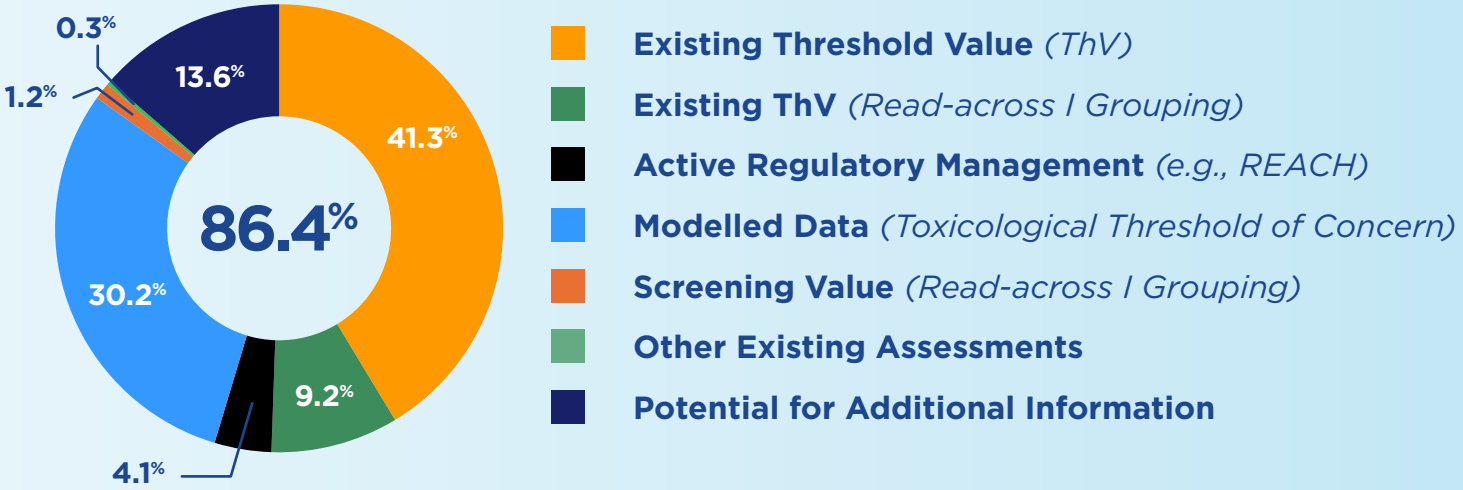
UNEP's Chemicals in Plastics Report (2023) highlighted often-overlooked chemical-related aspects of plastic pollution, including potential impacts on human health, the environment, resource efficiency and circularity. In parallel, the International Council of Chemical Associations (ICCA) launched its Plastic Additives Database to increase transparency on chemical use in plastics.

Building on data from the UNEP report, ICCA enhanced all 13,186 entries. The resulting database contains information on 13,375 chemicals, including 4,549 verified plastic additives in commerce. To underscore the depth of existing knowledge, ICCA compared and validated the database entries against global chemical inventories and toxicological data and found there is broad information available for these chemicals.

This reinforces ICCA's support for transparency and the continued implementation of risk-based chemicals management frameworks, and opposes the assumption that a uniform, hazard-only approach is necessary or the best alternative path to protect health and the environment.

- **ICCA analysis and UNEP's report affirms governments are able to use existing health and environmental data to inform risk-based national policy on additives**.
    - Over 86% of the chemicals associated with plastics identified have sufficient toxicological data to assist in identifying and minimizing potential risks.
    - Identifying chemicals and their uses with low potential risks allows regulators to conduct rapid risk screenings, focus limited resources on only those chemistries that need a detailed risk assessment, and implement risk management measures to minimize risks only where required.
- **ICCA's findings challenge claims of widespread data gaps and the suggestion that a uniform hazard-only regime is the only viable solution.**

TOXICOLOGICAL DATA AVAILABLE FOR CHEMICALS IN ICCA DATABASE

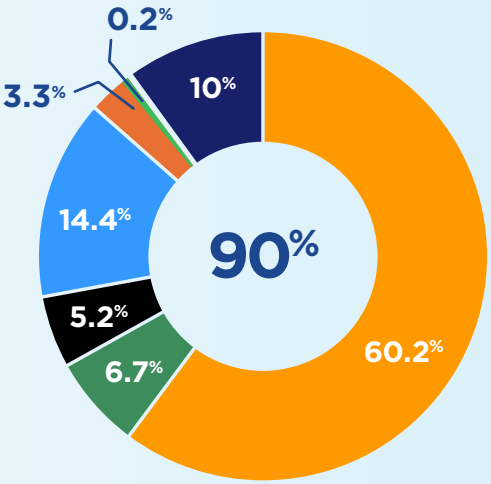


Of the ~13,000 chemical substances associated with plastics:

- **UNEP indicates approximately 3,200 have hazardous properties of concern.**
- **Over 97% of the ~3,200 chemicals with hazardous properties have robust enough hazard information to enable national chemical management frameworks/laws to conduct a screening level risk assessment.**

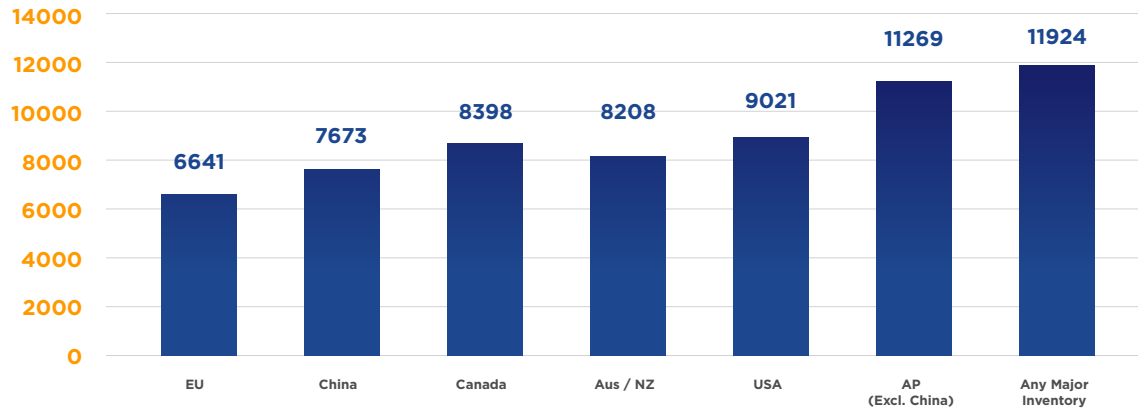
- **ICCA has verified which chemicals are currently being used as plastic additives.** Plastic additives are chemical substances added to plastic materials, either during production or later in the process of making products and packaging, that enable efficient processing of the plastics and/or provide beneficial properties to the final plastic products.
  - The number of chemicals currently in commerce and used as additives is 4,549.
  - 90% of the 4,549 verified plastic additives have easily accessible toxicological data that can be used to inform a screening-level risk assessment. Additional work is ongoing to manually assess the remaining 10% of plastic additives to verified data accessibility.*

TOXICOLOGICAL DATA AVAILABLE FOR ADDITIVES IN COMMERCE



- **Existing Threshold Value** *(ThV)*
- **Existing ThV** *(Read-across / Grouping)*
- **Active Regulatory Management** *(e.g., REACH)*
- **Modelled Data** *(Toxicological Threshold of Concern)*
- **Screening Value** *(Read-across / Grouping)*
- **Other Existing Assessments**
- **Potential for Additional Information**

NUMBER OF DATABASE CHEMICALS FOUND ON REGULATORY INVENTORIES

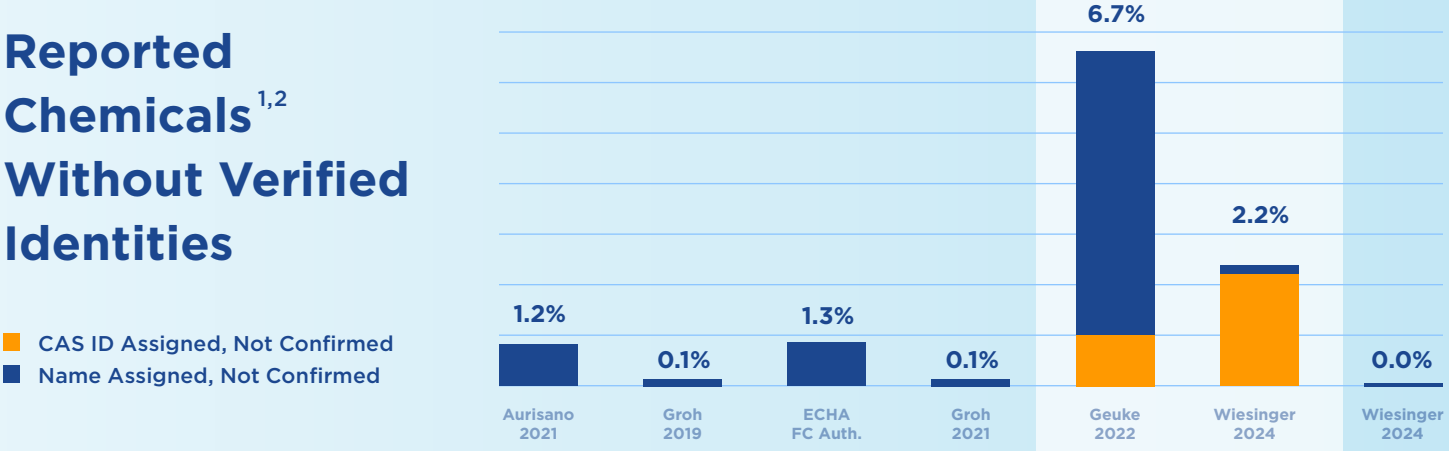


- **ICCA's analysis reveals that 89.2% (11,924) of the 13,375 chemicals identified by UNEP and ICCA's database and 94.5% (4,300) of the plastic additives in commerce are already referenced and indexed on one or more chemical inventory.**
  Moreover, 51.6% (6,906) of the total number of chemicals and 72.8% (3,314) of plastic additives are referenced and catalogued in major chemical inventories in 5 or more regions.
- **ICCA strongly supports chemical regulations driven by countries' chemical management laws.**
  Many chemicals used as plastic additives are also used in other materials or for entirely different uses. That's why it's important to have comprehensive chemical management programs/laws to regulate chemicals holistically.
- **Chemicals management regulation is also addressed by the Global Framework on Chemicals (GFC).**
  The GFC is a critical pathway and promotes the development of comprehensive risk-based, chemical management structures and tools.
- **ICCA's Plastic Additives Database** provides greater transparency, aggregates existing health, environmental, & chemical management information, and supports risk-based chemical management capacity building in developing economies. **Learn more at** plasticscircularity.org/additives/

The UNEP report was followed in March 2024 by the 'PlastChem' report, whose results were recently published in Nature with funding support from Norway.[1, 2]

- The PlastChem Report (2024) claims to identify an additional 4,764 chemicals associated with plastics not in the original UNEP report. However, many could not be matched against validated chemical inventories or toxicological lists. ICCA welcomes conversation about these additional chemicals, and verification to ensure that the list is accurate for regulatory and scientific use.

Reported Chemicals[1,2] Without Verified Identities



FOOTNOTES, INFORMATION SOURCES, AND REFERENCES

"Potential for Additional Information" indicates chemicals or substances that have been identified but whose hazard data may be derived from a group of related chemicals or estimated with non-standard models. These chemicals require additional analysis which is currently on-going. In addition, new assessment tools (e.g., FDA's Expanded Decision Tree) were recently developed and will be applied to the chemicals in the ICCA Plastic Additives Database.

https://www.fda.gov/food/hfp-constituent-updates/fda-releases-new-tool-toxicity-screening-chemicals-food

Potential for read-across relevant threshold information was evaluated using the US EPA's AMOS tool to obtain chemical classification information (ClassyFire) with the addition of minimum information criteria based on the size and data density of the identified chemical classes.

EXISTING TOXICOLOGICAL DATA SOURCE(S)

Data Type	Data SubType	Details	Source
Threshold Value	DNEL	Oral and/or Inhalation, Systemic Long-term (General Population)	3
Threshold Value	DNEL	Inhalation, Systemic Long-term (Worker)	3
Threshold Value	OEL	8-hour Occupational Exposure Limit (OEL)	5
Hazard Potential	[-]	No threshold value derived (low - moderate effects)	4
Hazard Potential	[-]	Substance is low hazard potential (e.g., high MW polymers)	6
Threshold Value	sPOD	Statistical Point of Departure (SPOD) - Aurisano et al., 2023	7
Threshold Value	rFD, TDI	Reference Dose (RfD), Tolerable Daily Intake (TDI)	8
Regulatory Assessment	CA_CMP2; CA_CMP3	CMP Phase 2 & 3 Risk Assessments (incl. grouping)	9
Regulatory Assessment	EU_PACT1	EU PACT - Data Generation & Assessment (REACH)	10
Regulatory Assessment	EU_PACT2	EU PACT - Assessment of Regulatory Need (REACH)	10
Regulatory Assessment	EU_PACT3	EU PACT - Regulatory Risk Management & Restriction	10
Toxicological Data	ToxVal	Data Available to Support Screening Threshold Derivation	8
Modeling & QSARs	Cramer_TTC	Toxicological Threshold of Concern (TTC) Calculation(s)	11, 12

REFERENCES

1 United Nations Environment Programme and Secretariat of the Basel, Rotterdam and Stockholm Conventions (2023). Chemicals in plastics: a technical report. Geneva.

2 Monclús, L., et al. (2025). Mapping the chemical complexity of plastics. Nature 643, 349–355. https://doi.org/10.1038/s41586-025-09184-8. Previously reported as PlastChem Report. (2024). https://plastchem-project.org/

3 DNELs accessible from the ECHA REACH portal.

4 Based on available data, expert judgement of registrant(s), and ECHA guidance [ECHA part B Guidance on Derivation of DNEL/DMEL from Human Data, footnote 5]: no systemic, long-term general population or worker DNEL was derived for this substance.

5 OELs collected from national and professional organization data sources.

6 Expert judgement. Substances with a polymeric structure (e.g., MW > 1000 & low bioavailability) were positively identified using name matching queries.

7 Aurisano, Nicolò, et al. (2023) https://doi.org/10.1289/EHP11524

8 Judson, R. (2018). https://doi.org/10.23645/epacomptox.7800653

9 Canadian Chemical Management Plan https://www.canada.ca/en/health-canada/services/chemical-substances/chemicals-management-plan.html

10 ECHA PACT Tool https://echa.europa.eu/pact

11 Roberts, D. W., et al. (2015) https://doi.org/10.1016/j.yrtph.2015.09.017

12 EFSA (2019) https://doi.org/10.2903/j.efsa.2019.5708

* Aurisano, N., et al. (2021). https://doi.org/10.1016/j.cogsc.2021.100513.
Groh, K., et al. (2019). Sci Total Environ 651, 3253-3268.

* Groh, K.J., et al. (2021). https://doi.org/10.1016/j.envint.2020.106225.

* Geueke et al., (2022). FCC MigEx DB (v1.0. https://www.foodpackagingforum.org/fccmigex.

* Wiesinger, H., et al. (2021). Environmental Science & Technology 55, 13, 9339–9351.

* Wiesinger, H., et al. (2024). LitChemPlast: An Open Database of Chemicals Measured in Plastics. Environ Sci Technol Lett. 2024 Oct 29;11(11):1147-1160. doi: 10.1021/acs.estlett.4c00355.