

Quantification of Forever Chemicals In Waste Feedstocks and Products

Global PFAS Problem

Common Items with PFAS



Improper removal of products with PFAS have led to the **contamination** of **water** sources and the **foods** we eat, which can enter our body. This can cause (2):

- Developmental delays in children
- Increased cholesterol
- Increased risk of some cancers

Through my research, I aim to **quantify** the amount of **PFOS** and **PFOA** in waste so that they can be **removed**, which will allow for **safer products**.

High Res LC/Q-TOF



PFOS/PFOA Analysis

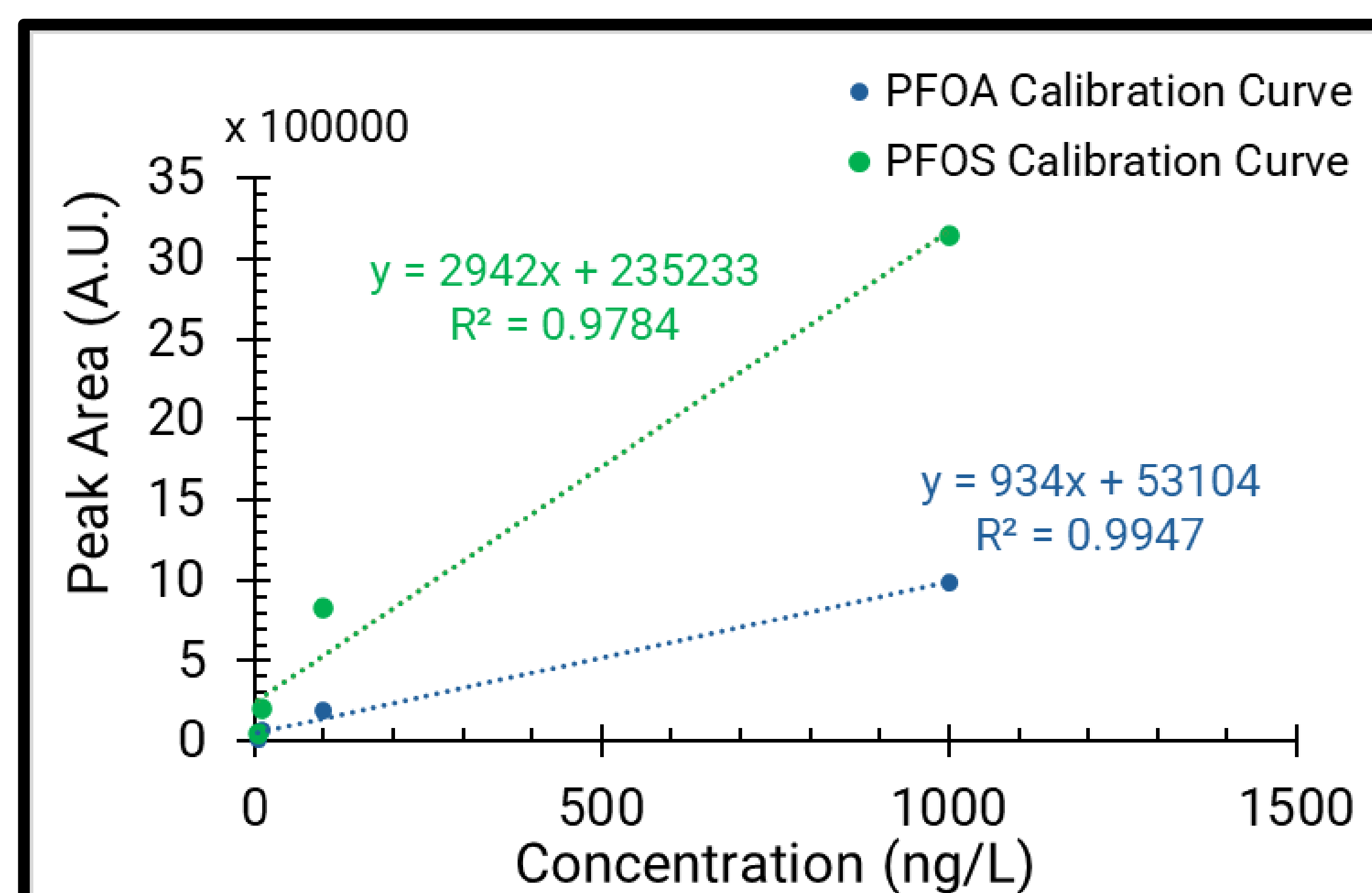
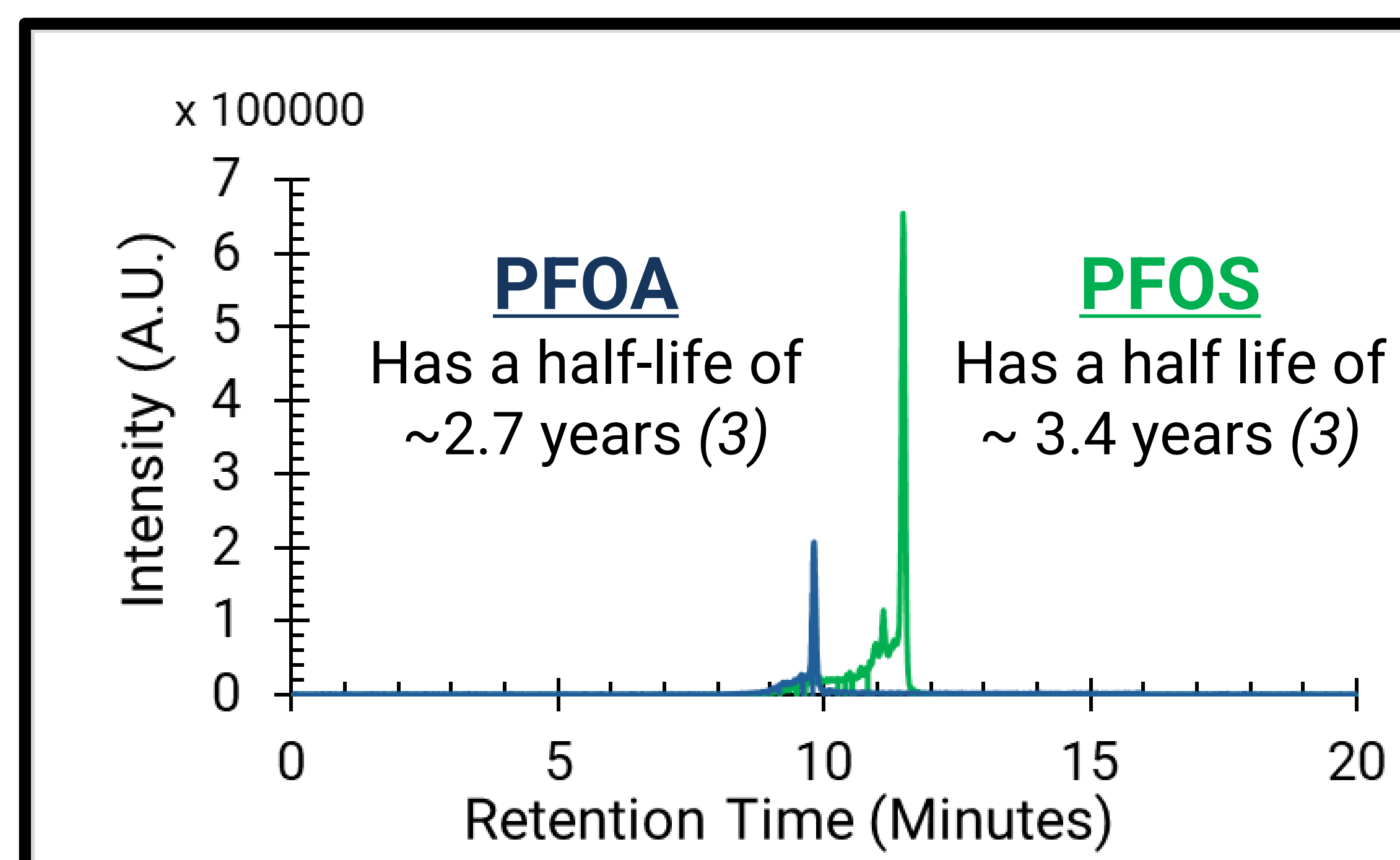


Table 1: PFOS/PFOA analysis cost of aqueous sample

Category	Total Cost
Reagents	\$48.25
Consumables	\$34.21
Total Cost For One Run	\$82.46



Step 1: Analyze the sample for PFOS/PFOA peaks.

Step 2: With prepared standards, create calibration curve

Step 3: Extract compounds from PFAS materials using EPA 1633

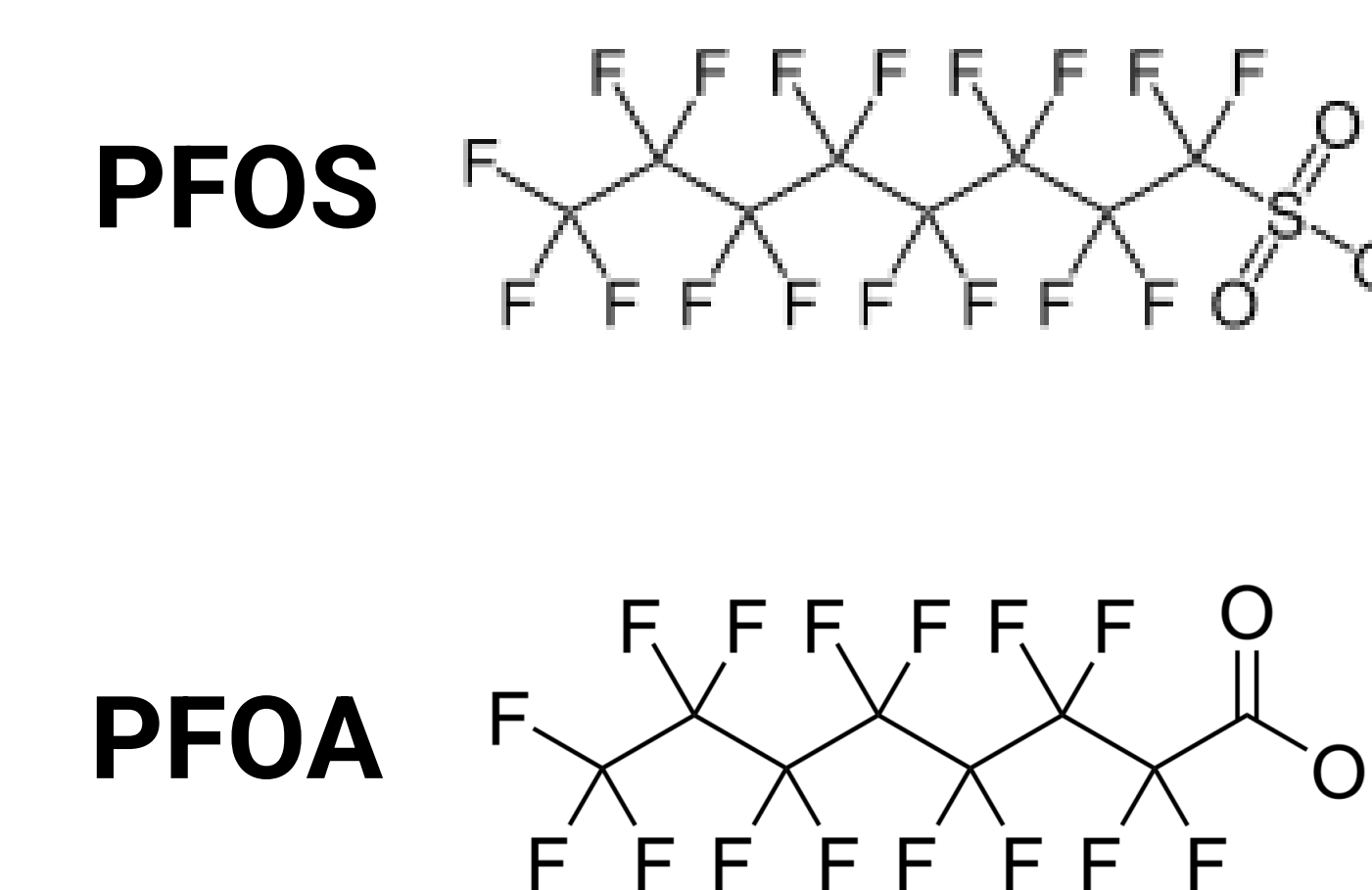
Step 4: Calculate unknown concentration of PFOS/PFOA

Future Work

1. Analyze solid waste and aqueous samples
2. Analyze tissue samples
3. Evaluate destructive capabilities of Hydrothermal Liquefaction and PFAS compound (4)

Classroom Implementation

Students create models of new molecules with new properties to replace PFAS in various products. This could include removing the fluorine-carbon bond to make the molecule biodegradable, etc.



Goal: Create chemicals that can **replace PFAS** so that the **environment** is **safer**.

Acknowledgements

This material is based upon work supported by the National Science Foundation under Grant No. EEC-2055507

Thank you, RET staff and fellow teachers and the Teixeira Lab Group for all support given

This material is based upon work supported by The Department of Energy under Grant No. DE-EE0010299

References

1. *Breaking Down Toxic PFAS*. Earthjustice. <https://earthjustice.org/feature/breaking-down-toxic-pfas>.
2. ITRC. *History and Use of Per- and Polyfluoroalkyl Substances (PFAS) Found in the Environment*; 2020. https://pfas-1.itrcweb.org/wp-content/uploads/2020/10/history_and_use_508_2020Aug_Final.pdf.
3. Li, Y.; Fletcher, T.; Mucs, D.; Scott, K.; Lindh, C. H.; Tallving, P.; Jakobsson, K. Half-Lives of PFOS, PFHxS and PFOA after End of Exposure to Contaminated Drinking Water. *Occupational and Environmental Medicine* **2017**, *75* (1), 46–51. <https://doi.org/10.1136/oemed-2017-104651>.
4. Li, J.; Pinkard, B. R.; Wang, S.; Novosselov, I. V. Review: Hydrothermal Treatment of Per- and Polyfluoroalkyl Substances (PFAS). *Chemosphere* **2022**, *307*, 135888. <https://doi.org/10.1016/j.chemosphere.2022.135888>.