

Flint, Michigan Water Crisis

Introduction

The Flint water crisis began when residents of the town in Michigan began noticing strange colored water coming from their taps. Ultimately, this was a result of elevated lead levels in the water, a completely preventable incident that changed the relationship between the Flint community and the government for a long time.



A comparison of water in Flint and water in Detroit:
https://www.deadlinedetroit.com/articles/1454/not_just_flint_nearly_2_000_u_s_water_systems_have_excess_lead_in_usa_today

The Crisis

- Municipalization of the water supply in Flint, Michigan in the early 1910's, led to the government relying on the Flint River for water (Masten et al.)
- To accommodate for the growing population and to save money, the local government decided to switch to using water from Lake Huron.
- 2014 - provider switch (Masten et al.)
 - Town had the choice to continue receiving Lake Huron water or temporarily use Flint River water treated at their own plants, which many experts, including a supervisor at the plant, warned could be extremely dangerous (Masten et al.)
 - Led to people getting rashes, the water smelling weird and having a weird color, and being corrosive. It even went as far as E. coli being found in the water (Masten et al.)
- Lasted for 18 months without significant attention from the government (Denchak).

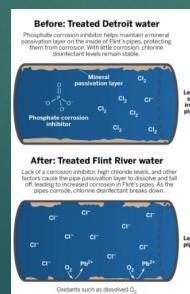
Key Reactions and Data

- The reaction that caused the lead pipes to dissolve into the water supply occurred as a result of the lack of anti-corrosion treatment
- Resulted in the corrosion of the layer of rust separating the pipe from the water
- The lack of phosphate (PO_4^{3-}) caused the rust layer coating the inside of the lead pipe to react with the other solutes in the water.



$E_{\text{cell}} = 0.13 + 0.40 = 0.53 \text{ V}$ - means that it's spontaneous under standard conditions

The addition of phosphate results in $\text{Pb}_3(\text{PO}_4)_2$ which is insoluble and coats the inside of the pipes to prevent the lead from being dissolved (Dingle).



A look at what the difference in the lead pipes with and without added phosphate:
<https://www.acs.org/content/acs/en/education/resources/highschool/chemmatters/past-issues/2016-december-2016/flint-water-crisis.html#:~:text=When%20flint%20changed%20its%20water,lead%20ions%20entered%20the%20water>



An image of the dissolved lead in the water pipes in Flint Michigan:
<https://news.engin.umich.edu/2017/07/missing-lead-in-flint-water-pipes-confirms-cause-of-crisis/>

Chem 105b Final
Samyukta Vakkalanka

Impact of the Event

In the end, the water crisis exposed the environmental injustice that causes events like these to disproportionately harm people of color. The decision to go forward with the switch in water, despite warnings from experts, as well as the extensive time that it took to resolve the issue shows a disparity in how these communities are valued in the eyes of the government (Buckley et al.). The health impacts caused by lead exposure and lack of access to water led to damage to the nervous system of children as well as rashes and other side effects of decreased hygiene. (Ruckart et al.)

Prevention

To prevent this type of crisis in the future, the solution can be as simple as the government spending the time and money to make sure that any changes made to the water supply are completely safe and will not cause any other reactions. When the phosphate was not added, it resulted in the precipitation of the lead of the pipes, which could have been prevented if the phosphate had been added or if the pipes were not made out of lead. Overall, the incaution of the government when making changes to the water supply should have been prevented (Smith et al.).

References

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