

Name:

SCI 105

Activity #5: The Flint Water Crisis – Chemical Reactions

Introduction

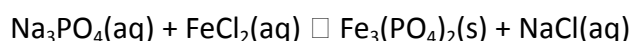
This activity contains a series of activities that leads students to explore the Flint Water Crisis and the chemistry of the problem.

Pre-Activity - Flint Water Supply Before 2014

1. Predict the products of following reaction: $\text{Na}_3\text{PO}_4(\text{aq}) + \text{FeCl}_3(\text{aq}) \square$

- a) $\text{Fe}_3(\text{PO}_4)_2$
- b) FePO_4
- c) $\text{Fe}_2(\text{PO}_4)_3$
- d) NaCl
- e) PO_4Cl_3

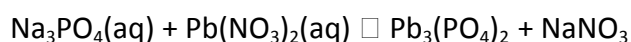
2. Determine the coefficients to balance the following chemical reaction:



3. Predict the products of the following reaction: $\text{Na}_3\text{PO}_4(\text{aq}) + \text{Pb}(\text{NO}_3)_2(\text{aq}) \square$

- a) $\text{Pb}_3(\text{PO}_4)_2$
- b) PbPO_4
- c) $\text{Pb}_2(\text{PO}_4)_3$
- d) NaNO_3
- e) PO_4NO_3

4. Determine the coefficients to balance the following reaction:



5. Why did the governor of Flint move the city's water supply from Lake Huron to the Flint River?

6. Historically and currently, how was the Flint River used? Is this river currently polluted and undrinkable?

7. What is your initial perspective on this case, and how would you propose resolving the issue?

Task I - The Flint Water Crisis: What's really going on?

Form a group of four students per group. Please read the document about the Flint case and answer the following questions. You can find the document on Blackboard.

- 1) What contaminants are found in the tap water in Flint?

- 2) What are considered safe levels of lead in human blood in parts per million (ppm)?
What concentration (ppm) of lead in drinking water is considered dangerous ("action level") by the US EPA?

- 3) What are some of the effects of exposure to lead for adults? For children?

- 4) How has using the water in Flint affected the local population? What has the population reported happening by using the water?

- 5) What happens to the Flint River water as it goes through the city's pipes? Why? (This answer needs to be explained using chemistry!)

- 6) How could the Flint water problem have been prevented? Explain the process of removing heavy metals from water resources.

Post-Activity: Discussion Questions

- 1) Is Flint's problem an economic problem? What is Flint planning to do to correct the problem? What needs to be done to correct this problem? What are some obstacles that Flint faces in resolving the water crisis?
- 2) What implications does this crisis have for older cities across the US? What can be done to stop a water crisis from occurring in other cities? What are the obstacles cities face?
- 3) What is being done to help children who have been exposed to lead?

Additional Resources

How lead ended up in Flint's tap water

<https://cen.acs.org/articles/94/i7/Lead-Ended-Flints-Tap-Water.html>

Flint's water crisis and the troublemaker scientist

<https://www.nytimes.com/2016/08/21/magazine/flints-water-crisis-and-the-troublemaker-scientist.html>

The Flint water crisis yields hard lessons in science and ethics

<https://www.americanscientist.org/article/flint-water-crisis-yields-hard-lessons-in-science-and-ethics>

Corrosive chemistry

<https://www.scientificamerican.com/video/corrosive-chemistry-how-lead-ended-up-in-flint-s-drinking-water1/>

The science behind the Flint water crisis

<http://www.iflscience.com/editors-blog/science-behind-flint-water-crisis-corrosion-pipes-erosion-trust/>

Ethics lessons from the Flint water crisis

<https://www.complianceweek.com/news/opinion/ethics-lessons-from-the-flint-water-crisis#XFh7olxKiUk>

Why is it possible that Flint River water cannot be treated to meet federal standards

<http://flintwaterstudy.org/2015/08/why-is-it-possible-that-flint-river-water-cannot-be-treated-to-meet-federal-standards/>

Flint Water Crisis: What's Being Done to Help Children Exposed to Lead

<http://abcnews.go.com/Health/flint-water-crisis-children-exposed-lead/story?id=36376739>

