Water testing for PFOS and PFOA

Posted by Anonymous on Tue, 2016-08-16 12:32

Water testing: Is it possible to do classroom testing for PFOS and PFOA in water samples? If so, how would you go about it?

What other water quality/contamination tests could be done in a classroom?

Thanks.

Voting:

No votes yet

Australian Curriculum:
Planning and conducting
Year Level:
Senior Secondary
Laboratory Technicians:
Laboratory Technicians

Showing 1-1 of 1 Responses

Water testing

Submitted by sat on 24 August 2016

PFOS and PFOAs

PFOs (Perfluorooctane Sulfonate) and PFOA (Perfluorooctanoate) are part of a chemical group that have been used in the manufacture of some common household products such as non-stick cookware and fabric treatments, and have been used previously in some types of fire-fighting foam[1].

These chemicals do not break down in the environment[1] and are considered environmental contaminants as they are toxic to mammals and bioaccumulative[2]. Commercial testing laboratories use highly sensitive Liquid Chromatography Mass Spectrometry instruments because PFOS and PFOA are present in very small quantities and measured in parts per billion or parts per trillion.[3]

Science ASSIST has found a reference to PFOS and PFOA testing that requires a liquid chromatograph[4]. This instrumentation is not usually found in schools and, whilst this would make an interesting investigation, is definitely beyond the scope of most schools.

Alternative water testing:

Science ASSIST suggests water quality tests that align with the curriculum, student skill sets, and are readily available and cost effective for schools. The following tests are reproducible and meaningful to students:

- **Physical parameters:**
  - Temperature
  - Turbidity using a turbidity tube or data logging equipment
  - pH using test strips or pH meters
  - Salinity using a meter or data logging equipment
  - EC (electrical conductivity) using a meter or data logging equipment. Combined pH and EC meters may be purchased.
  - Dissolved oxygen using a meter or data logging equipment
- **Chemical parameters:**
  - Ammonia, nitrate, nitrite, phosphate and sulfate. Separate test strips or aquarium testing kits are available to quickly perform these tests
- **Biological indicators:**
  - Macroinvertebrates

Test meters can be purchased as ‘hand held’ models, which are effective while field testing. These are generally available from reputable science suppliers at a reasonable cost. Data logging equipment can be used for many applications in school science and it is worth investigating sensors that may suit your testing needs in the biology, chemistry and physics disciplines. See our list of School science suppliers.

Note: Although a number of resources discuss faecal coliform tests, Science ASSIST does not recommend the testing for faecal bacteria due to the risks of cultivating human pathogens. It is however an important indicator for water health and we suggest accessing websites with information regarding Australian drinking water guidelines[5] and Australian guidelines for managing risks in recreational water[6,7].

There are several educational resources available. Note that there may be updated methods

available for some of the tests described. Here are some links to some school-based resources:

NSW DET. 2009. *Water quality testing* DET website, http://lrrpublic.cli.det.nsw.edu.au/lrrSecure/Sites/Web/about_fieldwork/...

'Statewide Education Resources' Waterwatch Victoria website. http://www.vic.waterwatch.org.au/cb_pages/education.php (Accessed October 2016)

Department of Environment, Climate Change and Water NSW. 2010. *Senior Waterwatch Teacher's Guide*, Office of Environment and Heritage NSW website, http://www.environment.nsw.gov.au/resources/waterwatch/SnrTeachGuide/200...

References

[1]'PFOS and PFOA', NSW Government Health website, http://www.health.nsw.gov.au/environment/factsheets/Pages/pfos.aspx (Accessed August 2016)

[2]'Perfluorooctane Sulfonate (PFOS) and related chemical products', OECD website, http://www.oecd.org/env/ehs/risk-management/perfluorooctanesulfonatepfosandrelatedchemicalproducts.htm (Accessed August 2016)

[3]'PFOA Testing', Applied Technical Services website, https://atslab.com/chemical-analysis/pfoa-testing/ (Accessed August 2016)

[4]Tracy, Mark; Liu, Xiaodong and Pohl, Christopher. 2008. *Analysis of Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoate (PFOA) in Water Samples Using Reversed-Phase Liquid Chromatography (RPLC) with Suppressed Conductivity Detection*, Dionex Corporation website, http://tools.thermofisher.com/content/sfs/posters/68680-LPN-2133-01-PFOS-note.pdf

[5]NHMRC. 2016. *Australian drinking water guidelines*, NHMRC website, https://www.nhmrc.gov.au/about-us/publications/australian-drinking-water-guidelines

[6]NHMRC. 2008. *Australian guidelines for managing risks in recreational water*, NHMRC website, https://www.nhmrc.gov.au/about-us/publications/guidelines-managing-risks-recreational-water

[7]Department of Health, Western Australia and the University of Western Australia. 2007. *Microbial Quality of Recreational Water* Department of Health, Western Australia website. http://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/water/envwater/other-publications/PDF/Microbial%20Quality-of-Recreational-Water-Guidance-Notes.ashx

---