



Apr 30, 2021

Procedure for measuring extraction efficiency

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ABSTRACT

Capturing dissolved organic matter from seawater using solid phase extraction is not 100% efficient. We use this protocol to quantify the amount of organic carbon retained during the extraction step. Comparing this value to the concentration of dissolved organic carbon in the initial water sample allows us to quantify the efficiency of the extraction procedure.

PROTOCOL CITATION

Krista Longnecker, Gretchen Swarr 2021. Procedure for measuring extraction efficiency. **protocols.io**
<https://protocols.io/view/procedure-for-measuring-extraction-efficiency-bumfnu3n>

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CREATED

Apr 29, 2021

LAST MODIFIED

Apr 30, 2021

OWNERSHIP HISTORY

Apr 29, 2021 Urmilas

Apr 29, 2021 Krista Longnecker Woods Hole Oceanographic Institution

PROTOCOL INTEGER ID

49543

MATERIALS TEXT

Extract from solid phase extraction
40 ml glass vials with Teflon-lined septa
Concentrated hydrochloric acid
pipet and pipet tips
Vacufuge
TOC analyzer (our lab uses a Shimadzu TOC-V_{CSH} total organic carbon analyzer with a TNM-1 module for total nitrogen)

Procedure for measuring extraction efficiency

- 1 This protocol starts with the eluent from a solid phase extraction resin. Dry down eluents in **8 mL** vials (all the way down, no solvent remaining!).
- 2 While drying down prepare **40 mL** EPA vials with **25 mL** MQ water and **25 µl** **12 M** HCl.

3 

Once the **8 mL** vials have dried down fully add **1 mL** of MQ water and vortex.

4 

Add **400 µl** of this vortexed solution to your prepped **40 mL** EPA vials. The final volume should be **25.425 mL**.

5 

Load the **40 mL** vial on to the autosampler for the TOC analyzer (**150 µl** is injected onto the column).

6 Once these are done, dry down the remaining solution in the **8 mL** vials for long term storage.

Extraction efficiency calculation:

Note that this calculation assumes that you have dried down the entire extract for this analysis and that no sample has been removed from the extract for other analyses.

Example for 466 µM NPOC in DOC (*not* TOC) sample and 240 ml total volume of extract:

$$(240 \text{ ml}) (466 \text{ µM}) = (1 \text{ ml}) (x)$$

$$x = 111,840 \text{ µM in extract if 100\% efficient}$$

Actual measured carbon in extract example (for sample with 46 µM measured carbon):

$$(400 \text{ µl}) (x) = (46 \text{ µM}) (25 \text{ ml}) (1000 \text{ µl} / 1 \text{ ml})$$

$$x = 2875 \text{ µM}$$

$$\% \text{ efficiency} = 2875 \text{ µM} / 111,840 \text{ µM} = < 3\%$$