Charcoal treatment of seawater to remove organics (esp. vitamins).

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Abstract

Charcoal treatment of seawater for removal of organics. This is an updated approach to that used by Carlucci & Silbernagiel, 1970. The approach was used in Paerl et al., 2015 Limnology and Oceanography; DOI: 10.1002/lno.10009

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Before start

Obtain:
2 designated flasks for charcoal treatment
2 stir bars
1 filtration rig for charcoal treatment
1 GF/F filter (47mm recommended)
1 disposable filtration rig with 0.2 µm filter
activated charcoal (Sigma C9157 recommended)
1 filtration rig with 0.2 µm filter for filter-sterilzing the initial seawater sample

Protocol

Step 1.
Collect seawater for medium, filter through a 0.22 µm filter to remove cells and particles. Autoclave or microwave the filtered water to sterilze. Allow water to cool before treating with charcoal. Pour the sterilzed water into a designated flask with stir bar that can contain at least 1L of liquid.

Step 2.
Wash activated charcoal. Add 2.5g NaCl to 500mL of Milli Q water into a designated clean flask for charcoal washing. The charcoal sticks so it is best to dedicate a flask for washing (and other treatment steps). Add 10g of activated charcoal to the NaCl2 solution. Add stir bar. Stir for at least 10min.

Step 3.
Recover the charcoal by filtration upon a glass fiber (GF/F) filter using a designated filter rig. Use a scoopula to add washed charcoal to the sterilized seawater made in Step1. Take care not to rip the GF/F filter. Obtain the remaining charcoal in the rig by swirling sterilzed water in the filtration rig and pouring that out into your flask with the sterilzed seawater (and now washed charcoal).

Step 4.
Stir the washed charcoal plus sterilzed seawater for at least 30min, using a stir plate.

Step 5.
Remove charcoal from the seawater by filtering the mixture using a disposable filtration rig with a 0.2 µm filter. After removing the charcoal and any larger than 0.2 µm particles, work in a sterile environment (laminar flow hood recommended) and aseptically add desired nutrient requirements to your seawater to complete your medium.