P287-WE

A UNIVERSAL PASSIVE SAMPLER FOR DISSOLVED ORGANIC MATTER IN FRESHWATER AND MARINE ENVIRONMENTS

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Dissolved organic matter (DOM) represents the largest pool of mobile carbon on Earth, and is a fundamental link between the terrestrial and aquatic environments. DOM is a significant contributor to the global carbon cycle, an important mediator in the physical and chemical interactions that govern the fate and transport of many contaminants, and an integral player in climate change. However, despite its importance, the structural components in DOM have yet to be described in detail, due in part to the difficulty in its isolation. In this study, we first describe the use of a novel passive sampler for the isolation of DOM from freshwater, show the limitations of this passive sampler in saline waters, and present an improved design for the universal application in both freshwater and marine environments.

The freshwater passive sampler consists of a molecular weight selective membrane (1,000 kDa) and an anion exchange resin (diethylaminoethyl-cellulose (DEAE-cellulose)) (Fig.1). Nuclear Magnetic Resonance (NMR) spectra indicate the samplers isolate DOM that is near indistinguishable from that isolated using the batch DEAE-cellulose procedure. However, the material isolated on the passive samplers cost ~$0.15 per mg to isolate while DOM isolated using the traditional batch procedure costs $8-10 per mg. Samplers are easy to construct, negate the need for pressure filtering and also permit a range of temporal and spatial experiments that would otherwise be difficult or impossible to perform using conventional approaches. For example, DOM can be monitored on a regular basis at numerous locations, or samplers could be set at different depths in large lakes. They can also be deployed into hard to reach environments such as wells, ground water aquifers, etc, and as they are easy to use, they can be mailed to colleagues or included with expeditions to isolated places such as the Arctic and Antarctic.

The samplers have been shown to be effective in a range of freshwater environments including a large inland lake (Lake Ontario), a fast flowing tributary, and a wetland. However, due to the high affinity of Cl^- ions for the DEAE-cellulose, samplers that employ this resin are not effective in saline environments. To overcome this limitation, new resins have been examined as a substitute for a universal passive sampler that can be used in both fresh and saline waters. Here we discuss preliminary results of a passive sampler employing

activated charcoal as a selective resin for DOM sorption and show its effectiveness as a universal passive sampler (see Figure 1).

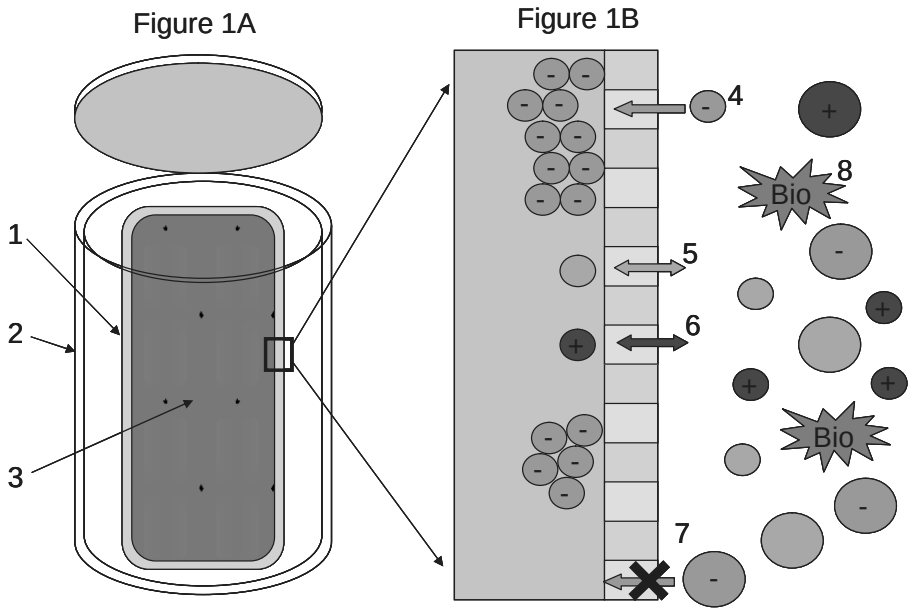

Figure 1A. Diagrammed schematic showing the components of the passive sampler. 1) 1,000 kDa Molecular Weight Cut Off (MWCO) Poly(vinylidene fluoride) (PVDF) membrane. 2) porous high density polyethylene (HDPE) casing to house sampler unit (designed in house) to prevent large organisms (fish etc.) and debris from compromising the membrane. 3) resin for DOM sorption. **Figure 1B**. Expanded region showing the resin/membrane/water interface. 4) dissolved negatively charged DOM enters the membrane and are sorbed onto the resin and concentrated many fold, 5+6) dissolved neutral or positively charged species (for example, metals in the case of positively charged) can enter the membrane but are not retained (*note* the vast majority of DOM is negatively charged), 7+8) large species including particulate organic matter and biological species cannot enter the membrane. The use of the membrane removes the need for filtering.