CLAIMS

1. A preconcentration device for measuring the amount of a trace analyte in a water body, the device comprising:

a vessel having an opening;

a hydrated polymer membrane that covers the opening in the vessel; and

an aqueous solution of a polyelectrolyte polymer provided in the vessel and in direct contact with the membrane, wherein:

the polyelectrolyte polymer is polydiallydimethylammonium chloride having a weight average molecular weight of from 200,000 Daltons to 350,000 Daltons; and

the polymer of the hydrated polymer membrane has a weight average molecular weight cut-off of 12,000 Daltons.

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2. The preconcentration device of Claim 1, wherein the polymer of the hydrated polymer membrane is a hydrated cellulose polymer membrane.

3. The preconcentration device of Claim 1 or Claim 2, wherein the preconcentration device further comprises a light absorbance detection unit, where the vessel is adapted to enable a sample of the aqueous solution of a polyelectrolyte to be provided to the detection unit.

4. The preconcentration device of Claim 3, wherein the light absorbance detection unit comprises a detection chamber for containing the sample, a light emitting LED and a photodiode attached to a measuring unit, wherein the light emitting LED and the photodiode are arranged such that the light from the light emitting LED passes through the detection chamber before contacting the photodiode.

5. The preconcentration device of Claim 4, wherein the photodiode is a LED.

6. The preconcentration device of any one of the preceding claims, wherein the analyte is selected from one or more of the group selected from a phosphate, arsenic and an arsenate.

7. A method of analysing the amount of a trace analyte in a water body, wherein the method comprises the steps of:

(a) submerging a preconcentration device in a water body, the preconcentration device comprising:

a vessel having an opening;

a hydrated polymer membrane that covers the opening in the vessel; and

an aqueous solution of a polyelectrolyte polymer provided in the vessel and in direct contact with the membrane;

(b) removing an aliquot of the aqueous solution of a polyelectrolyte polymer after a period of time has passed, and providing the same to a light absorbance detection unit comprising a detection chamber, a light emitting LED and a photodiode attached to a measuring unit, optionally the aliquot is obtained by removing the preconcentration device from the water body;

(c) adding a chemical reagent that reacts with the analyte to produce a colour before or after providing the aliquot of the aqueous solution to the detection chamber;

(d) measuring the light absorbance following reaction of the chemical reagent and analyte and calculating the concentration of the analyte in the water body, wherein:

the polyelectrolyte polymer is polydiallydimethylammonium chloride having a weight average molecular weight of from 200,000 Daltons to 350,000 Daltons; and

the polymer of the hydrated polymer membrane has a weight average molecular weight cut-off of 12,000 Daltons.

8. The method of Claim 7, wherein the preconcentration device is adapted to enable a sample of the aqueous solution of a polyelectrolyte to be provided to the detection unit.

9. The method of Claim 7 or Claim 8, wherein the photodiode is a LED.

10. The method of any one of Claims 7 to 9, wherein the analyte is selected from one or more of the group selected from a phosphate, arsenic and an arsenate.

11. An apparatus for analyte detection and/or measurement of a water body, comprising:

a floatable and/or a submergible vessel; and

the preconcentration device of any one of Claims 1 to 6, wherein the preconcentration device is adapted to enable at least the membrane of the preconcentration device to be in direct contact with water from the water body.