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Plastic Leachate Protocol V.1

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We use this protocol and it's working.

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Abstract

This protocol was comprised using a variety of methods from the literature to create leachates using solid plastics. It creates standard operating conditions that can be altered based on experimental procedure.

Protocol for making plastic leachates from solid plastic particles

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Note

We developed this protocol for our own plastic experiments that focus on plastic preproduction pellets. The pellets come small enough to be classified as microplastics (<5mm) without altering them in any way. Cutting up post-consumer environmental plastics, consumer plastics, etc. to various sizes as needed for experimentation is acceptable and will work with the protocol. It is recommended to take the average metrics (mass, volume, density, etc.) of the plastic pieces prior to use.

This protocol is also identical across plastic types (the 7 recycling categories used to distinguish between commonly used plastics).

Materials

2 -Glass receptacles with rubber stopped lids
-Balance Scale
-Benchtop shaker
-Thermometer
-Glass serological pipettes
-Metal mesh colander
-Vacuum filtration system
-Whatman GF/F glass fiber filters in **0.7µm**
-Freezer (-20°C)

Protocol

3d

3 Make leachates in glass bottles to avoid cross contamination. Fill the bottle with a set amount of solvent in mL. Solvent can be interchangeable depending on the experiment- synthetic freshwater/saltwater, algal media, filtered environmental water samples, etc.

3.1 Weigh your plastic material. Place a known weight (in milligrams) into a known amount of solvent (in milliliters). It is recommended to make a large batch of the highest concentration (mg/ml) of leachate you intend to use. Using the original solvent, you can dilute the leachate to lower concentrations.
EXAMPLE: Our experiment required concentrations of 1 mg/mL, 0.1 mg/mL, 0.01 mg/mL, and 0.001 mg/mL
We made 100mLs of leachate at 1mg/mL and diluted small batches of it as needed.

3.2 Place the bottle in a covered benchtop shaker (for incubation in the dark) and seal with cap. If room temperature is 25°C ± 2°C then the shaker can remain unheated; Otherwise use necessary means to achieve the temperature parameter. Set the RPM to 150.

3.3 150 rpm, 25°C, 72:00:00 3d

Leave incubating for 3 days.

3.4 Upon completion of incubation, leachates are filtered using vacuum filtration through a 0.7 µm Whatman Grade GF/F Filter to remove pellets and biotic contaminants.

3.5 Leachates are distributed into glass storage receptacles using 25mL borosilicate glass serological pipettes- to avoid plastic cross contamination- that have been previously acid-washed and autoclaved.

3.6 Take the pH of the leachates created. Leachates are either used immediately or stored frozen in glass receptacles at -20°C to prevent breakdown of compounds over time.

Protocol references

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