PLASTIC PANIC

An exploration of microplastics at the wastewater treatment plant

Question Cards

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ACTION STEP 1

FILL

What is wastewater?
Any water that has been used/affected by humans.

Where does wastewater come from?
Whatever we send down the sink, toilet, etc. from our homes, schools, businesses, and factories.

What happens to the water we send down the drain?
In some communities, wastewater travels through the sewer system and gets pumped to a WWTP to be processed before being released to the environment.

ACTION STEP 2

ADD

What are microplastics?
Tiny (smaller than 5mm) pieces of plastic.

Where are they coming from?
Many sources including washing polyester clothes, contacts flushed down the sink, microbeads in soaps, tires, road markings/paint. More than 2/3 of global releases of primary microplastics into the oceans comes from laundering synthetic textiles (63%) and abrasion of tires while driving (28%).

ACTION STEP 3

SAFETY

Why do scientists need safety glasses?
Safety glasses protect eyes from cuts and splashes and are an important part of PPE (personal protective equipment).

Have you ever had to wear safety glasses before?

ACTION STEP 4

FILTER

Why do you think the WWTP has a filter at the very beginning of the treatment process? What do you think would happen if WWTPs didn't have filters like this?
WWTPs have a filter to prevent clogging or damage in other parts of the treatment system.

What are the costs of having a filter?
WWTP staff have to constantly remove debris and clean clogs.

***Make a prediction:* what's going to happen to the microplastics in your sample when you pour it through the filter? How much, and what, will get caught?**

ACTION STEP 5

SKIM

At this station, notice how the microplastic pollutants in your sample separate into different layers in the water.

What water is the cleanest? Top, middle, or bottom?

Why do some plastics float and some sink?
Plastics have different densities that impact whether they float or sink. The size of the particle might also have an impact.

What do you notice about what floats vs. what sinks? What do you think would float and sink at the real WWTP?

ACTION STEP 6

DIGEST

What are the microbes doing here?
They are digesting the organic materials and excess nutrients that get into the water from things like human waste and food that goes down the drain.

What happens to the microplastics during this step of treatment?
Nothing. The microbes don't digest nonliving or inorganic things. This is a crucial part of the treatment process, but it doesn't help our plastic problem.

ACTION STEP 7

SANITIZE

This step kills bacteria.

Are all bacteria bad?
Not all bacteria are harmful. Bacteria, like in the step before, do so many important things for humans.

Does anything in your sample look different under the black light?
Some remaining microplastics may appear more or less visible under the light.

What other ways to sanitize water do you know about?

ACTION STEP 8

EXIT & SAMPLE

Are you satisfied with the cleanliness of your sample? Is it clean enough to go into the river?

What didn't the WWTP catch?
Some of the initial microplastics made it through the plant. In addition to microplastics, WWTPs aren't designed to remove salt, pharmaceuticals, and other emerging pollutants.

What could we do with microplastics once we've collected them?

What sorts of things could we do to prevent microplastics from getting through the WWTP to the streams?
Use less plastic in our daily lives, create less microplastics, install filters on washing machines, engineer and design processes at the WWTP to catch the microplastics.

Who do we need to work on this problem? All people with lots of different skills! Government – WWTP, industry – product design and manufacturing, Scientists – study what's actually happening.

ACTION STEP 9

EXAMINE SAMPLE

What shape are your microplastics? Are they Fibers? Beads? Something else? What do you think could be the source of your microplastics?

Do you notice any patterns with what types of microplastic make it through the treatment plant and which get caught in the treatment?

What can you do to help stop the plastic panic at the WWTP?