



Biodegradable Plastic

Large volumes of plastic waste generated aboard ships must be stored onboard, often for prolonged periods until they make port. In the future, a new type of environmentally friendly plastic that degrades in seawater may make it safe and practical to toss plastic waste overboard, freeing up valuable storage space, according to scientists.

Biodegradable plastics could replace conventional plastics that are used to make stretch wrap for large cargo items, food containers, eating utensils and other plastics used at sea, researchers say, though the biodegradable plastic has not yet been tested in freshwater. “We’re moving toward making plastics more sustainable, especially those that are used at sea,” said a researcher.

Conventional plastics can take years to break down and may result in byproducts that are harmful to the environment and toxic to marine organisms, conditions that make their disposal at sea hazardous. The new plastics are capable of degrading in as few as 20 days and result in natural byproducts that are nontoxic, say scientists.

The new plastics are made of polyurethane that has been modified by the incorporation of PLGA [poly (D,L-lactide-co-glycolide)], a known degradable polymer used in surgical sutures and controlled drug-delivery applications. Through variations in the chemical composition of the plastic, the researchers have achieved a wide range of mechanical properties ranging from soft, rubber-like plastics to hard, rigid structures, depending on their intended use.

When exposed to seawater, the new plastics degrade via hydrolysis into nontoxic products, according to the scientists. Depending on the composition of the plastics, these compounds may include water, carbon dioxide, lactic acid, glycolic acid, succinic acid, caproic acid and L-lysine, all of which can be found in nature, they add. Because the new plastics are denser than saltwater, they have a tendency to sink instead of float. That feature could also prevent them from washing up on shore and polluting beaches.

The plastics are now undergoing degradation testing by the U.S. Army in the Gulf of Mexico. The researchers note that the plastics are not ready for commercialization yet. More studies are needed to optimize the plastics for various environmental conditions they might encounter, including changes in temperature, humidity, and seawater composition. There are also legal hurdles to overcome, since international maritime law currently forbids disposal of plastics at sea.

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