

## Goodbye Plastic, Hello Edible Wrappers—or Nothing at all!

### Plastic packaging

Plastic trash creates special problems. Landfills are overflowing, islands of garbage are collecting in our oceans, and this trash doesn't disappear! **Plastic has a long half-life and can be toxic to wildlife.** Consider the plastic that wraps our food. When the sun's ultraviolet rays hit plastic floating on the ocean surface, the bonds between polymer molecules are broken. The plastics don't break up completely, but break down into tiny bits of plastic. When fish eat the plastic in place of real food, they starve to death.



**10–20 Years:**  
*Time it takes for a plastic bag to decompose in a landfill*

### Green packaging

Food is going high-tech. Smart packaging in the lunch box means a healthier planet. **Edible wrapping** mimics properties of petroleum products without environmental concerns. This technology is not new. For years, people have been taking soluble pill capsules and recently, dissolvable strips to sweeten breath and whiten teeth are on market shelves. Two major U.S. companies are producing edible food wrappings: Monosol and WikiCell Designs.



Edible oatmeal food pouches

**Monosol** will market edible food pouches this year. No packets to rip open and toss, just dissolve an oatmeal pouch, a drink stick, or cocoa mix in hot water. Stir until the flavorful wrapping dissolves. The pouches replace packaging that actually touches the food, but an outer box is needed to keep them clean on the supermarket shelf.

**5 Seconds:**  
*Time it takes for edible wrappers to decompose (it melts in your mouth or dissolves in hot water!)*

### Zero packaging

*in.gredients* opened the first zero-packaging store in the United States in 2011. This company, located in

Austin, Texas, advertises: "Bring in your containers, weigh and label them, fill them, and pay at the counter." People buy what is needed, and waste is minimized to promote healthy, sustainable lifestyles.



**Will you patronize a zero-packaging store? Will you try a WikiCell-covered ice cream?**

**Consider your options to help sustain our environment by reducing waste. If you'd like to share your opinions, contact us at: chemmatters@acs.org.**

**WikiCell Designs** produces ultra-thin flavored membranes, called WikiCells, that surround liquids or



WikiCell liquid covering: Outer and inner shells are edible.



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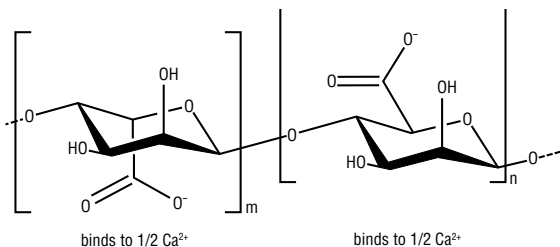


Figure 1. Anionic alginate molecules held together by  $\text{Ca}^{2+}$  cations in a WikiCell membrane.

solids, shielding them from oxygen, oils, and moisture to extend their shelf life. Unlike Monosol pouches, WikiCells are washable, so the outer container can act like the skin of a fruit. You just wash and eat them.

A WikiCell is made of two sustainable layers. Eat the inner wrapping, compost the shell; no plastic is involved. The inner edible membrane, like a grape skin, is held together by intermolecular electrostatic forces. Positively charged calcium ions bind with alginate, an anionic (negatively charged) polysaccharide from brown algae (Fig. 1). The outer compostable shell is made of the residue from sugarcane crushing.