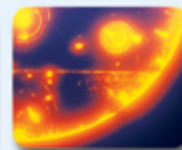
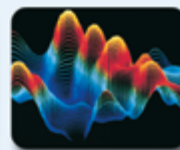


# Chemistry in Action



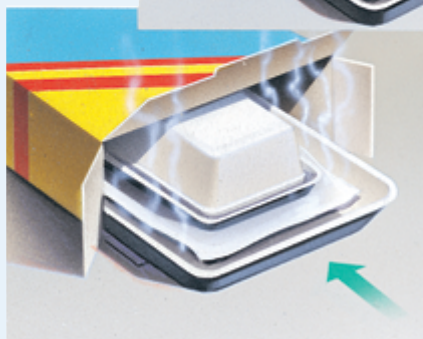
## Self-Heating Meals

Who would have thought that corrosion could be useful? The HeaterMeals Company did. This company uses the properties of saltwater corrosion to heat TV-type dinners, and now it is taking packaged foods to a new level of convenience.

HeaterMeals' products, as their name implies, come with a self-contained heat source. Each meal contains a package of food, a tray that holds a porous pouch containing Mg and Fe alloy, and a 2 oz pouch filled with salt water. When the salt water is poured into the tray with the porous pouch, it begins to vigorously corrode the metals. The sealed, pre-cooked food package is then placed on top of the tray and returned to its box, where the temperature of the food package is raised by 100°F, heating the meal in 14 min.

Corrosion, the process by which a metal reacts with air or water, is usually an undesirable event, such as when iron corrodes to form rust. With HeaterMeals, however, the corrosion process is speeded up to produce an exothermic reaction—with the excess energy as the desired result.

According to Drew McLandrich, of the HeaterMeals Company, the idea for using self-heating metallic alloy powders has been around since the



▲ *This product uses supercorrosion to give you a hot meal.*



1930s. "But," says McLandrich, "there really have been no significant uses of the product until the Desert Storm conflict, which led to the military's taking this technology and adopting it for field use so that soldiers could heat a meal-ready-to-eat.

"We've made about 80 million heaters for the military in the last 10 years. Lately we've been successfully marketing them to long-distance truck drivers. The product is in about 800 truck stops in 48 states."

The company has plans to develop other products using the controlled use of "supercorrosion." "A beverage could be heated," says McLandrich, "and we do have prototypes for a baby-bottle warmer. We're also working on making a portable hot cup of coffee or a hot cup of tea or cocoa."

### Questions

1. How did the development of self-heating metallic alloy powders benefit the military?
2. If the temperature of 50.0 mL of water is raised from 25.0°C to 100.°C using the self-heating meal package, what is the change in the enthalpy of the magnesium reaction in this package?



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