



Dear Beakman,  
 When you boil water,  
 you get oxygen  
 bubbles. Wouldn't that  
 leave hydrogen behind  
 that we could run fuel  
 cells with?  
 Cody Ede  
 Dubuque, Iowa

Beakman or Jax  
 P.O. Box 30177  
 Kansas City, MO 64112  
 Questions, name & address

For asking today's question, Cody wins the new DVD, *The Best of Beakman's World*.



Dear Cody,  
 You have a nice little *if/then* thing going with that question. Water is  $H_2O$ , a molecule made from 2 atoms of hydrogen and 1 atom of oxygen. *If* the bubbles in boiling water are oxygen, *then* we'd have hydrogen left over, and we could use that to run cars.

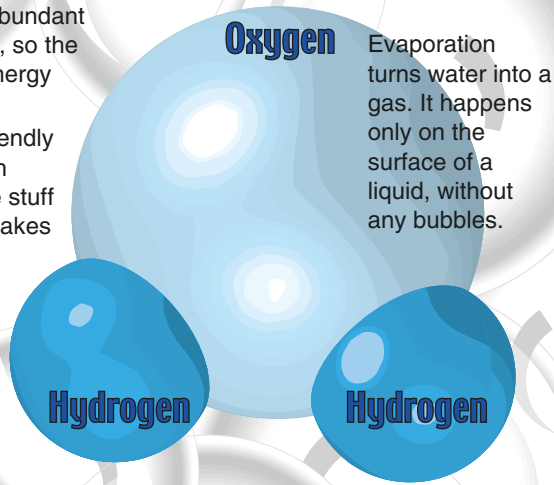
*If/then* logic falls apart if the *if* part is wrong. And I'm afraid your *if* is wrong. Boiling bubbles are not oxygen.

Bubbles form in water different ways. Only one of them makes oxygen bubbles, and it takes as much energy as we could produce using the hydrogen it also makes.

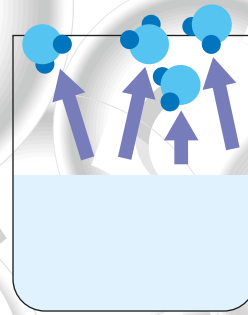
*Beakman*  
 Beakman Place

Hydrogen is the most abundant element in the universe, so the idea of using it as an energy source sounds good.

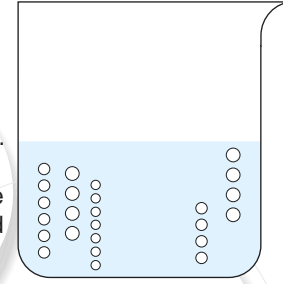
But hydrogen is very friendly and bonds together with other elements to make stuff like water,  $H_2O$ . And it takes energy to take apart molecules, making hydrogen more a way to store energy than a source of energy.



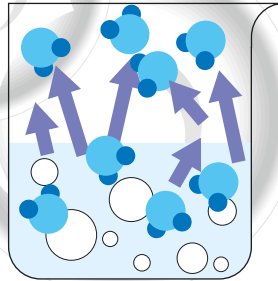
Evaporation turns water into a gas. It happens only on the surface of a liquid, without any bubbles.



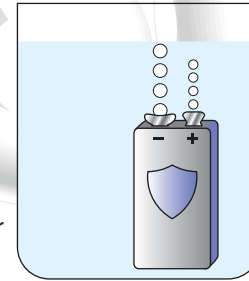
Air bubbles undissolve when you leave a glass of water on your bed table overnight. The gases in these bubbles are air, once dissolved in the water.



Boiling is about pressures. When the vapor pressure of a liquid equals air pressure, the liquid turns into bubbles of gas. The gas is water vapor, not oxygen.



Water molecules are held together by a force of nature. It takes energy to overcome it. Add a tiny pinch of salt to a glass of water and gently drop in



a 9-volt battery. When the water settles down, you'll see mist-like clouds on the terminals. Oxygen forms on the + side and hydrogen forms on the - side. (Throw the battery away after this experiment.)

P.S. from Jax: Hydrogen would be a wonderful thing to run cars on: no pollution and no kingdoms to deal with. Perhaps someday it will be you who figures out how to take apart  $H_2O$  to turn hydrogen into an energy source. If not you, then who?

