

## How power anodes work

When two different metals are connected together (or bonded together), a current flows from one metal to the other. This action is called electrolysis, and is true for all metals.

When two different metals are placed in fresh or salt water, and the metals are bonded, then the water will react with the higher noble metal first. So one metal will be oxidized away, while the other metal stays intact. This is a natural chemical reaction.

In the case of water heaters, the water heater tank is made of steel. The anode rod is made of magnesium or aluminum. Magnesium and aluminum are higher noble metals than steel, and they are chosen since both react easily with water.

The anode rod extends down into the tank from above. So both the metal tank and the anode rod are exposed to water. Over time, the anode is dissolved by the water while the metal tank stays intact. As long as the two different metals are bonded, the other metal is protected from oxidation (rusting).

A powered anode relies on electricity being fed into the anode to impose a flow of current rather than relying on the natural chemical reaction described above. If the powered anode is made from the right material and the electricity source remains on, the anode continues to protect the other metal (steel water heater tank) for many years.

All underground gasoline tanks now have powered anodes to protect them from rusting. Ship hulls and bridge piers also have anode rods to protect the metal from rusting.