# Osmosis generates an electrical current that is harnessed by membrane proteins

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Gerald Pollack has proven that osmosis is powered by the movement of protons, along the electrical gradient that forms spontaneously at contact zones thanks to adsorbed gel-phase of water (Zhao, 2009). I derived from his work that osmosis is likely the movement of protons only, not water, and that the oxygen evolution reaction that follows from loss of protons in alkaline (water) compartment will release electrons, that will move in the same direction as the protons (down their electrical gradient. ) In the presence of oxygen, the electrons and protons will combine with the oxygen.

The assumption I make is: osmosis will not work without atmospheric oxygen (as long as oxygen cannot move between compartments. ) This is easily testable. If true, then electrons must be moving too, only way water can form in the salt compartment.

If osmotic potential across membranes is an "electrical generator", this would mean that membrane proteins in biology could harness the electrical current that flows as long as osmotic production of water takes place in the salt compartment. The salt compartment would swell as the osmotic process takes place, and this is seen in mitochondria and in axons. The salt compartment would also need access to external oxygen, to catalyze the reaction (oxygen is released in the oxygen evolution reaction, $4\ OH^- \rightarrow O_2 + 2\ H_2O + 4\ e^-$, but diffusion of oxygen across the membrane slows down the reaction), and this is supplied with gills or lungs.

## References

Zhao, Q., Ovchinnikova, K., Chai, B., Yoo, H., Magula, J., & Pollack, G. H. (2009). Role of Proton Gradients in the Mechanism of Osmosis. The Journal of Physical Chemistry B, 113(31), 10708–10714. https://doi.org/10.1021/jp9021568