

## Turning Fruit into Power – Exploring Energy with a Lemon Battery

The lemon battery experiment is an engaging way to introduce students to the science of electricity and chemical energy conversion. Based on the principles first discovered by Alessandro Volta in 1800, this experiment allows students to see how a basic battery can be created using common materials, in this case, a lemon and two different metals.

A lemon battery works because of a chemical reaction between zinc and copper electrodes, with the lemon's citric acid serving as an electrolyte. When a zinc-coated nail and a copper coin are inserted into a lemon, the citric acid facilitates an *oxidation-reduction* reaction. Here, zinc (the anode) undergoes oxidation, losing electrons, while copper (the cathode) undergoes reduction, gaining electrons. This flow of electrons between the two metals creates an electric current, which can power small devices such as LEDs when several lemon cells are connected in series.

This experiment provides students with a tangible example of *energy conversion*: the chemical energy stored in the lemon's acidic juice is converted into electrical energy, which can be harnessed for practical use. Such hands-on activities make abstract scientific concepts accessible and lay the groundwork for understanding modern power sources, from household batteries to renewable energy technologies.

By exploring how everyday materials can produce electricity, students gain foundational knowledge of electrochemical processes and are encouraged to see the practical applications of STEM learning in the world around them.

### References

- Swartling, D., & Morgan, J. (2008). "Electricity and Energy Experiments Using Fruit and Vegetables." *Journal of Science Education for Kids*, 15(2), 45-49.
- Volta, A. (1800). "On the Electricity Excited by the Mere Contact of Conducting Substances of Different Kinds." *Philosophical Transactions of the Royal Society of London*, 90, 403-431.