

7.4.6: Chemical and Solar Cells



Figure 16.3.1

Can you identify the two objects pictured above? You've probably used objects like these many times. The photos show a TV remote (left) and a calculator (right). Both of them run on electric current. Current requires a source of voltage, which is a difference in electric potential energy.

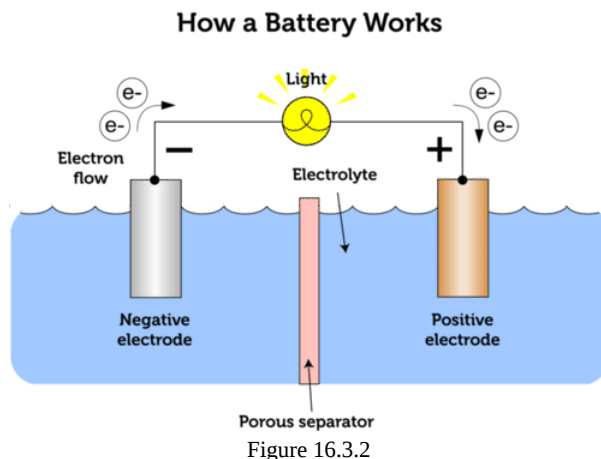
Q: The source of voltage is different in the remote and the calculator. Do you know what source of voltage each device uses?

A: The TV remote uses chemical cells as a source of voltage. The calculator uses a solar cell.

Chemical Cells

Chemical cells are found in batteries. They produce voltage by means of chemical reactions. Chemical cells have two electrodes, which are strips of different materials, such as zinc and carbon. The electrodes are suspended in an electrolyte. This is a substance that contains free ions, which can carry electric current. The electrolyte may be either a paste, in which case the cell is called a dry cell, or a liquid, in which case the cell is called a wet cell. Flashlight batteries contain dry cells. Car batteries contain wet cells.

The Figure below shows how a battery works. The diagram represents the simplest type of battery, one that contains a single chemical cell. Both dry and wet cells work the same basic way. The electrodes react chemically with the electrolyte, causing one electrode to give up electrons and the other electrode to accept electrons. Electrons flow through the electrolyte from the negative to positive electrode. The electrodes extend out of the battery for the attachment of wires that carry the current. The current can be used to power a light bulb or other electric device.



Solar Cells

Solar cells convert the energy in sunlight to electrical energy. Solar cells are also called photovoltaic (PV) cells because they use light (*photo-*) to produce voltage (*-voltaic*). Solar cells contain a material such as silicon that absorbs light energy. The energy knocks electrons loose so they can flow freely and produce a difference in electric potential energy, or voltage. The flow of electrons creates electric current. Solar cells have positive and negative contacts, like the terminals in chemical cells. If the contacts are connected with wire, current flows from the negative to positive contact. The Figure below shows how a solar cell works.

How a PV Cell Works

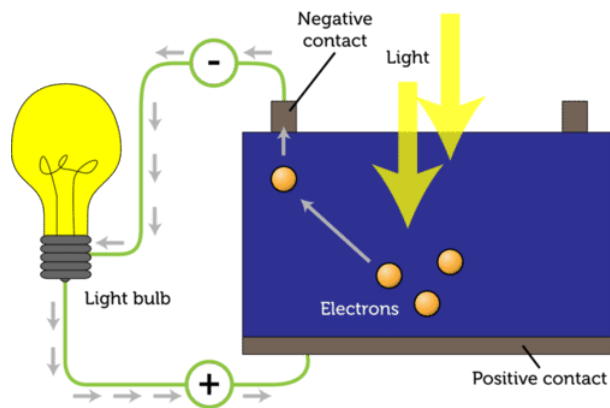


Figure 16.3.3



Summary

- Current requires a source of voltage, which is a difference in electric potential energy. Sources of voltage include chemical cells and solar cells.
- Chemical cells are found in batteries. They produce voltage by means of chemical reactions. They contain electrodes and an electrolyte, which may be a paste (dry cell) or a liquid (wet cell).
- Solar cells convert the energy in sunlight to electrical energy. They contain a material such as silicon that absorbs light energy and gives off electrons.

Review

1. What is voltage? How is it related to electric current?
2. How does a chemical cell produce current?
3. Explain how a solar cell works.

Additional Resources

Real World Application: Lithium Lasts Longer

Videos:



Study Guide: Electrical Systems Study Guide

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