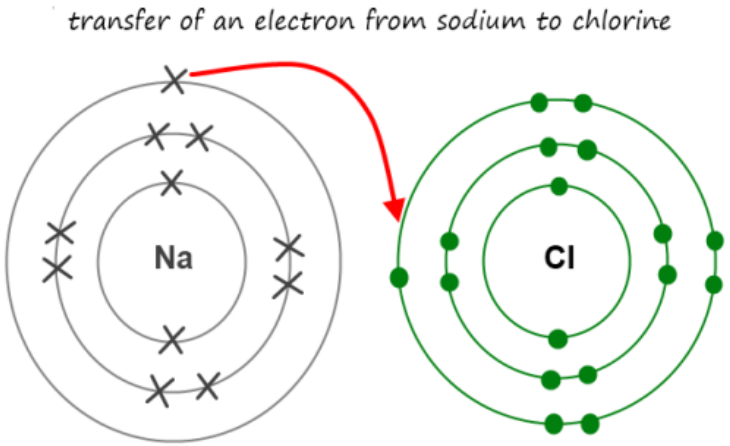
How does a battery work?

Electrochemical Cells and Voltage

Electrochemical Cells

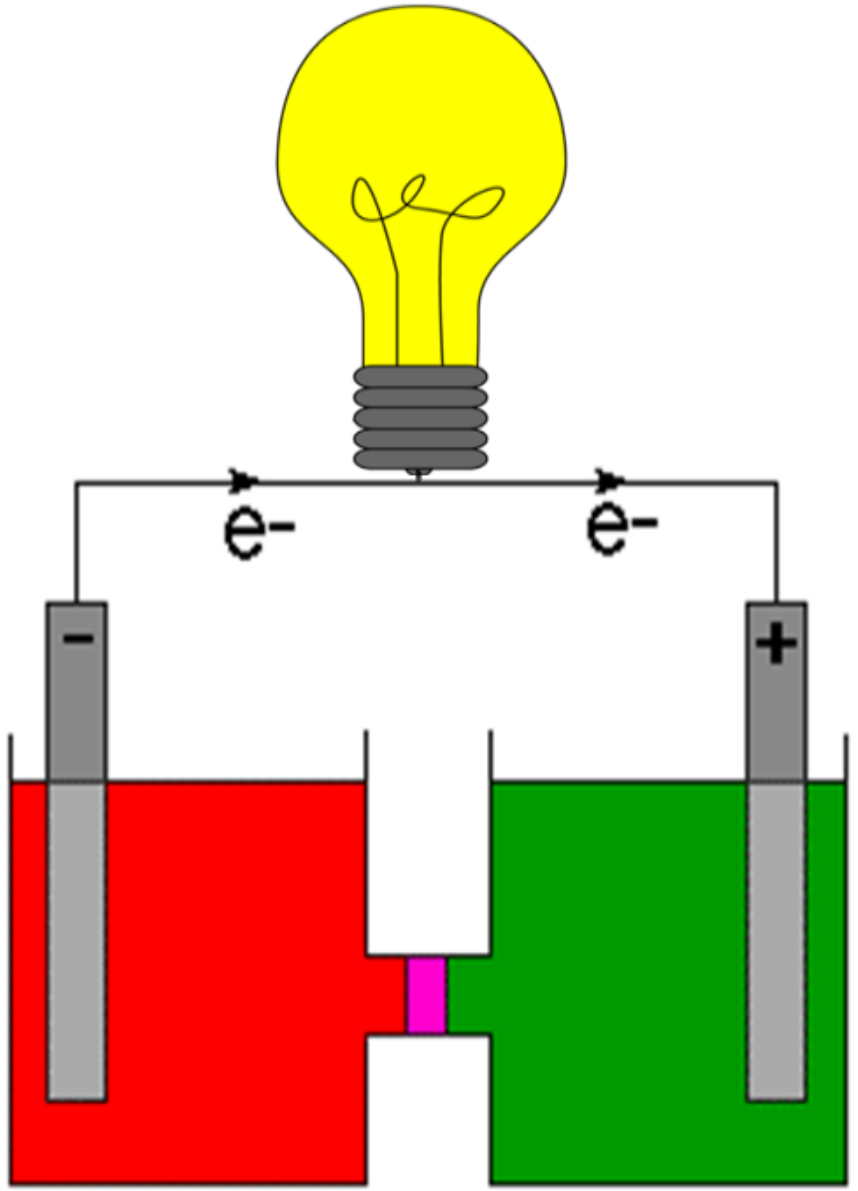
- An electrochemical cell is a device that uses chemical energy and converts it into electrical energy.

- Some substances like to easily give up their electrons and transfer them onto another substance.



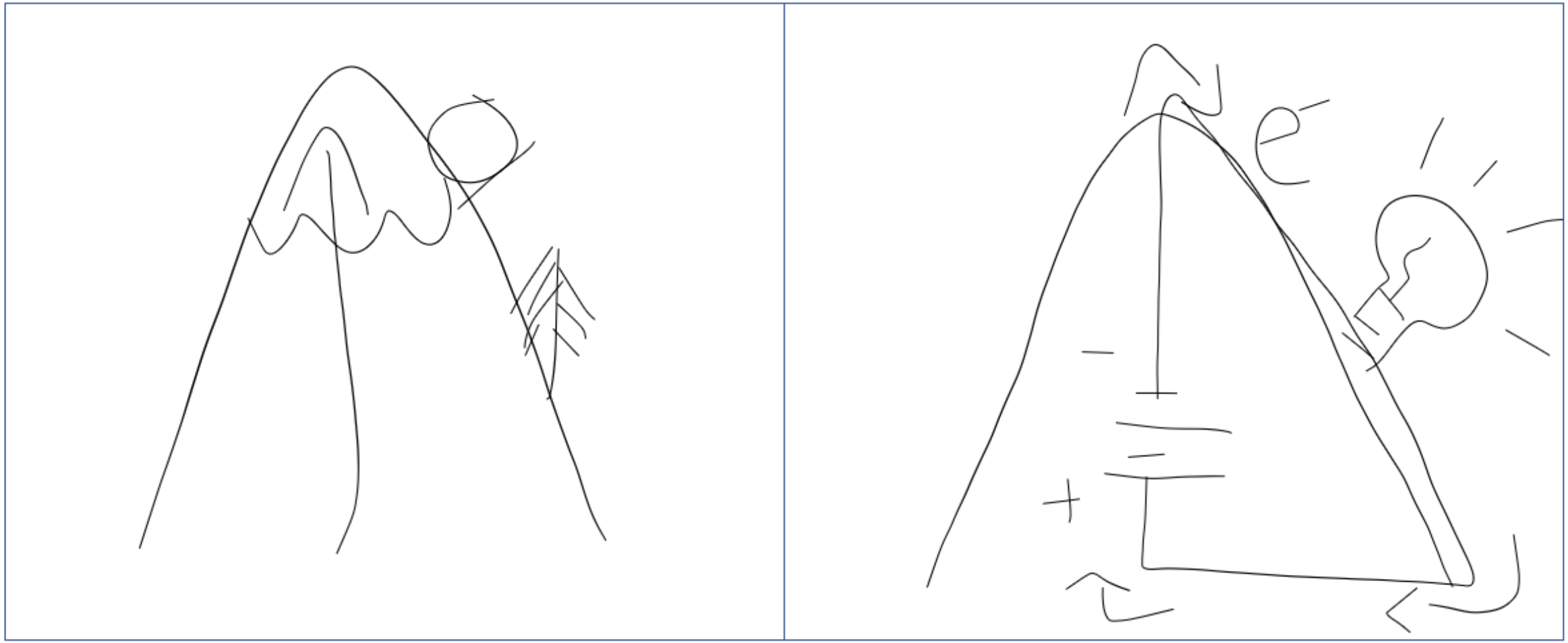
Electrochemical Cells

- In a cell we separate the substances and only allow the electrons to flow through a circuit (or wire).
- We can capture the flow which allows us to do work.
- Electrons flow from the negative terminal to the positive terminal.
- The negative terminal pushes the electrons away and the positive terminal pulls them in.



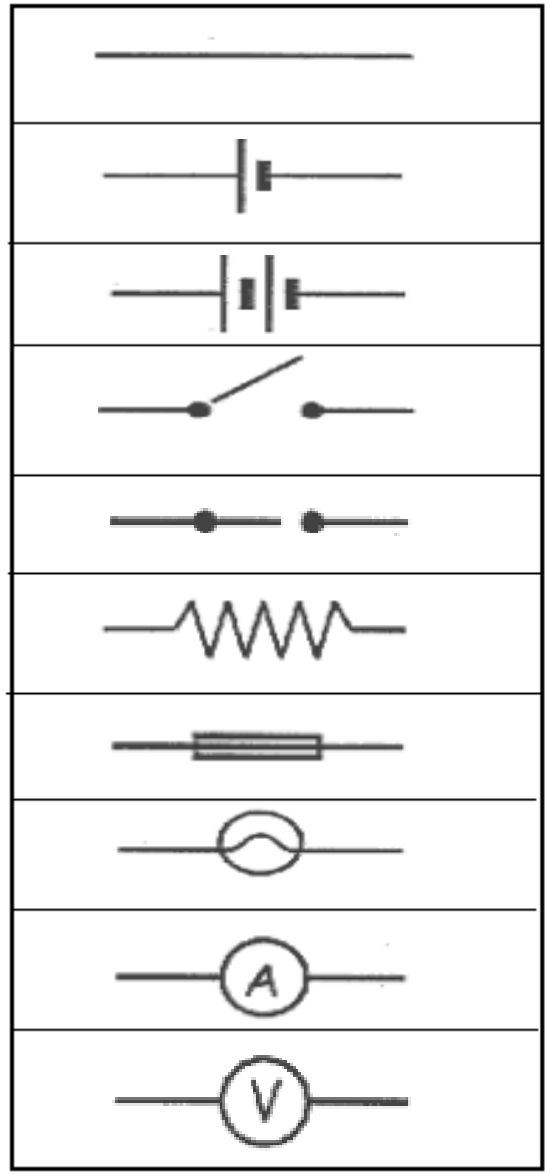
Voltage

- Voltage is potential energy of electrons.



https://www.khanacademy.org/science/electrical-engineering/introduction-to-ee/intro-to-ee/v/ee-voltage-intuition

Drawing Circuits



Wire

Single cell

Battery (2-cells)

Switch-open

Switch-closed

Resistor

Fuse

Light Bulb

Ammeter

Voltmeter

Voltage

- The *difference* between the potential energy of the electrons at the **positive terminal** and the potential energy of the electrons at the **negative terminal** is known as **electrical potential difference.**
- The difference between the two is measured in **volts** (V).
  - Volts are analogous to the weight or height of the object we lifted up the mountain.
- Another term for electrical potential difference is **voltage**.

Voltage and Cells

- The voltage of a cell depends on the chemicals which make up the cell.
- If we need more volts we can combine multiple cells into a **battery**.
- Technically the thing you would call an AA or AAA “battery” is actually one cell, not a battery.

This is a cell.

1.5 V

This is a battery ...

6.0V

... and so is this.

9.0V