

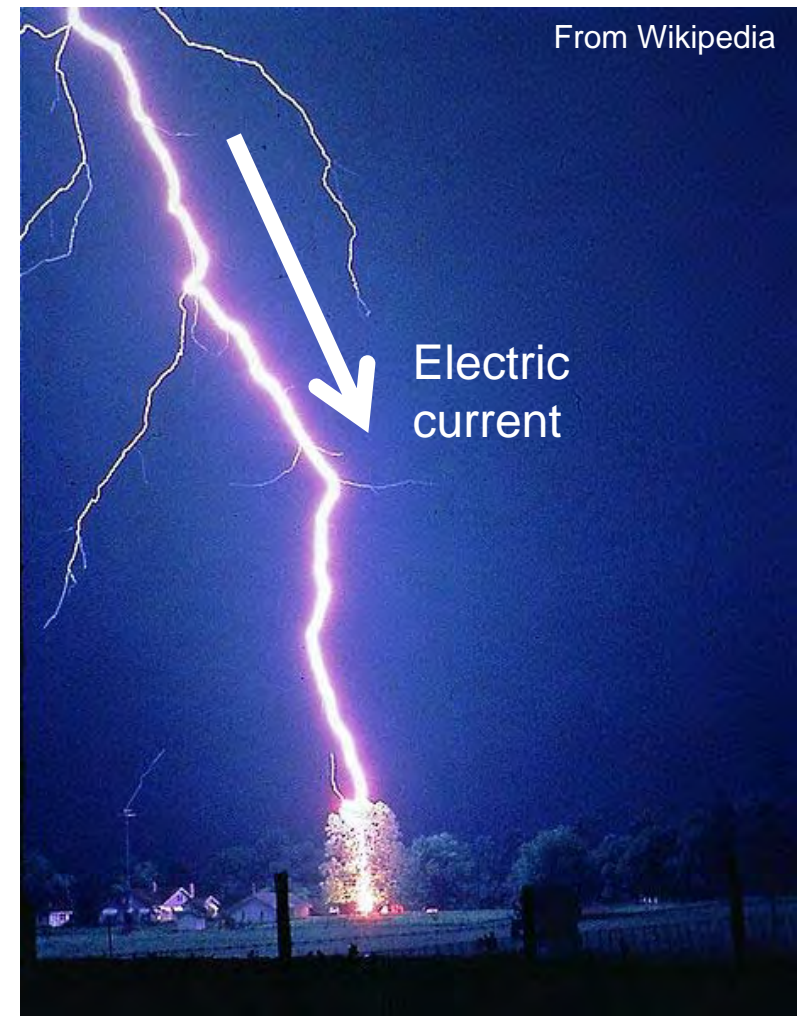
Electric Current



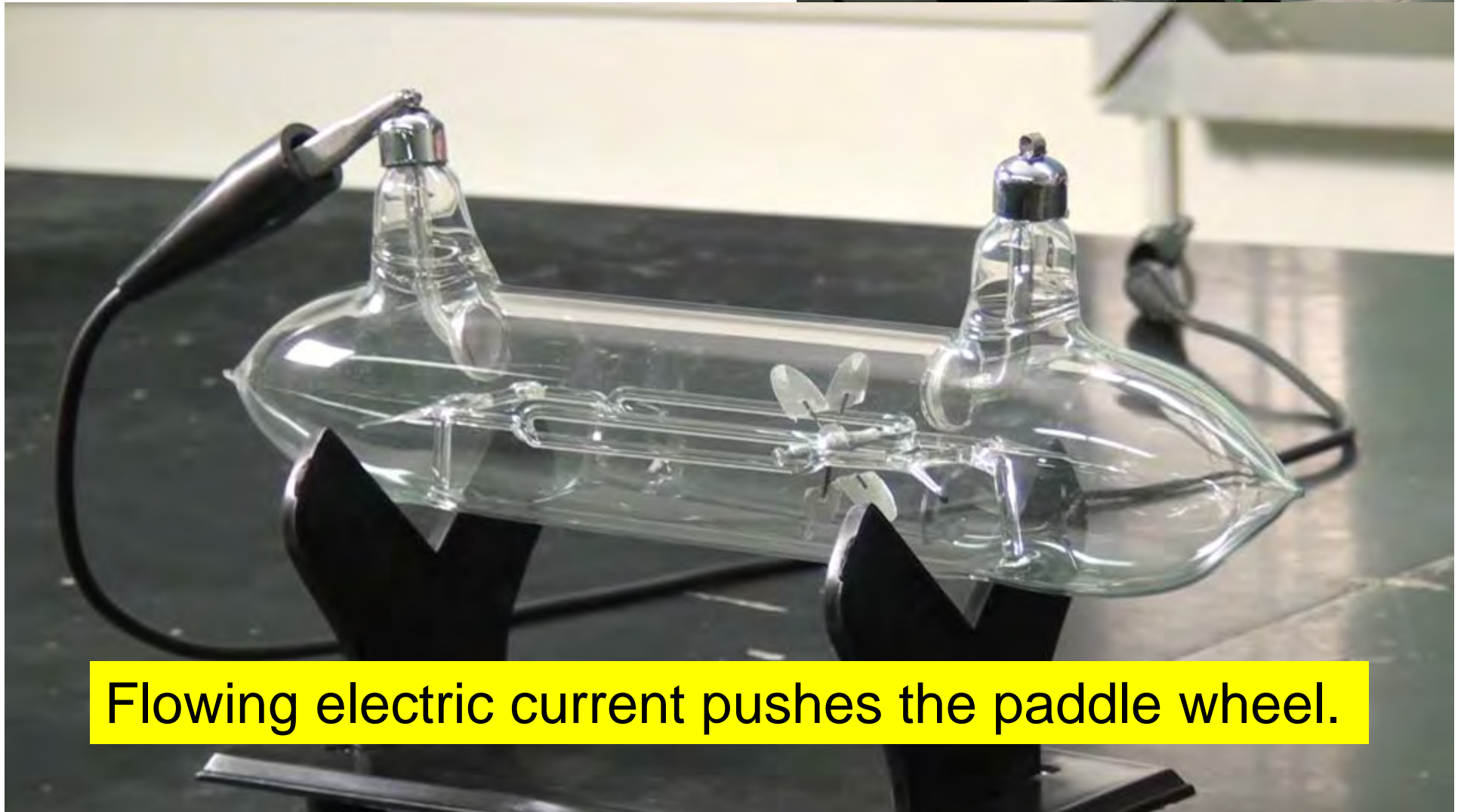
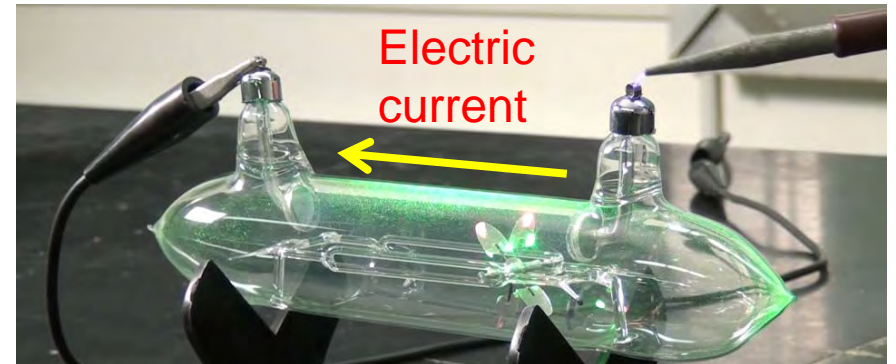
National Science Foundation
WHERE DISCOVERIES BEGIN

Electric Current

Electric current is the flow of electrical charges.

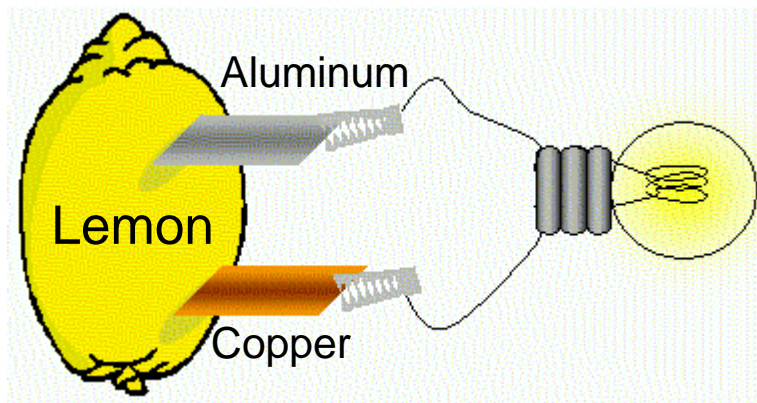


Electric Current

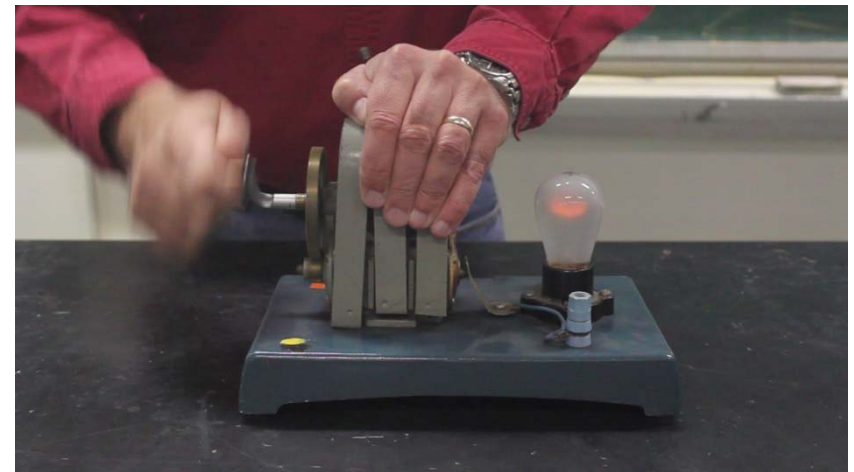


Voltage Sources

A sustained electrical current requires a “pumping device” to provide a voltage.

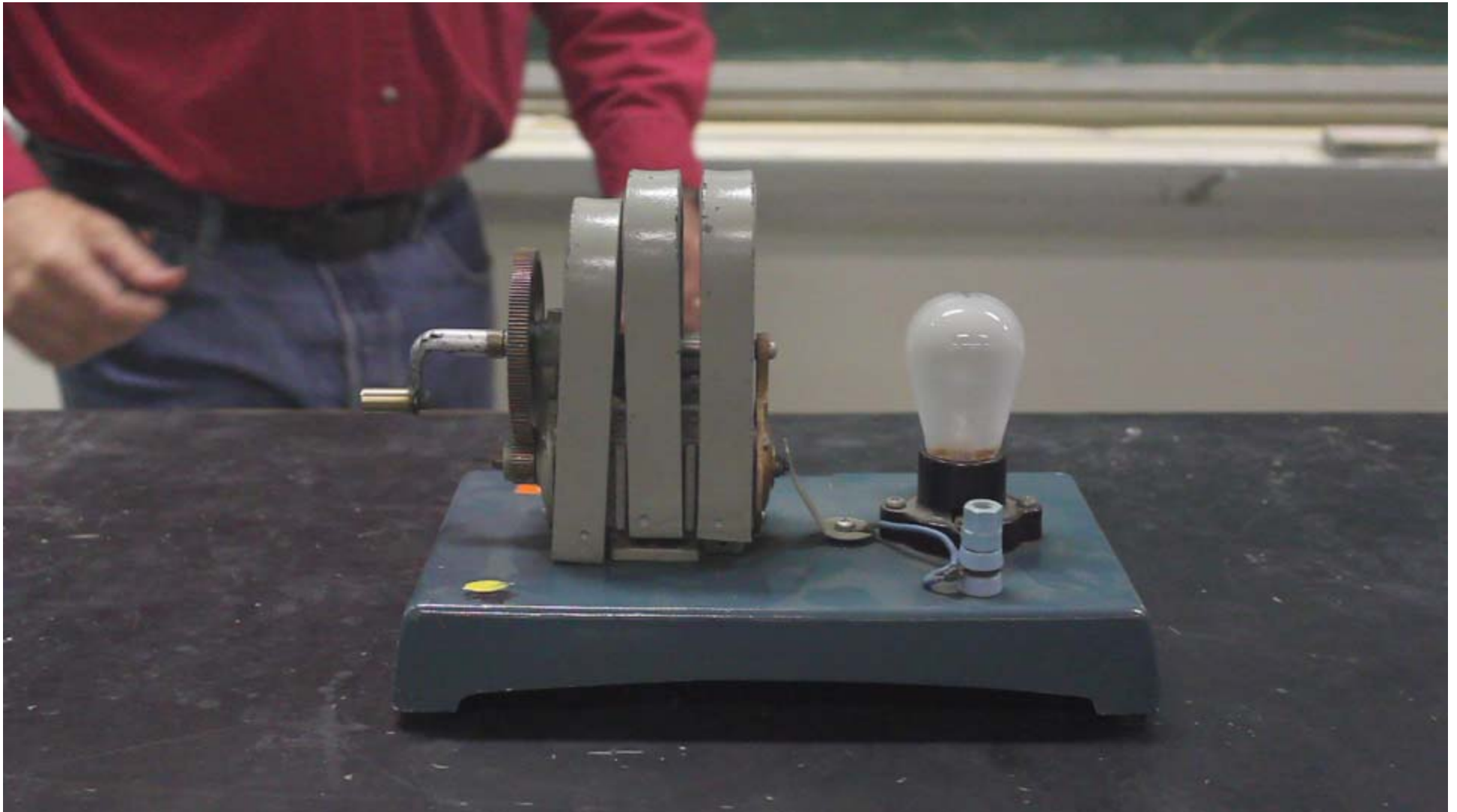


Simple Chemical Battery



Simple Mechanical Generator

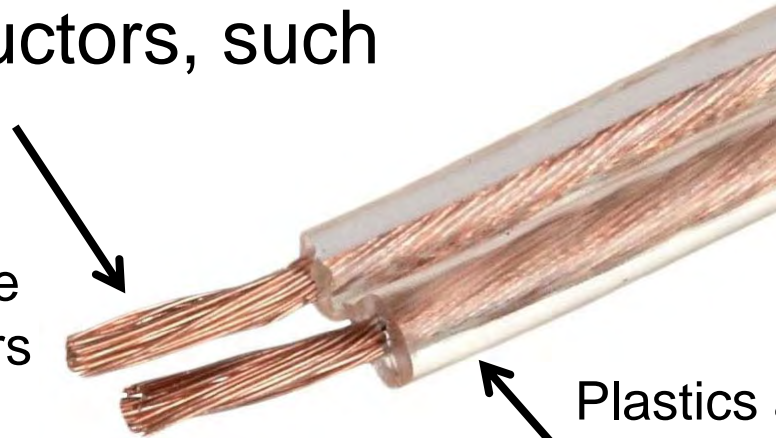
Electric Generator



Electrical Conductors & Insulators

Electric charges move easily in electrical conductors, such as in metals.

Metals are
conductors



Plastics are
insulators

Conductors have low resistance; insulators have high resistance.

Materials that resist the flow of electrical current are electrical insulators.

Ohm's Law

Electrical current depends on both the voltage and the resistance.



Georg Ohm

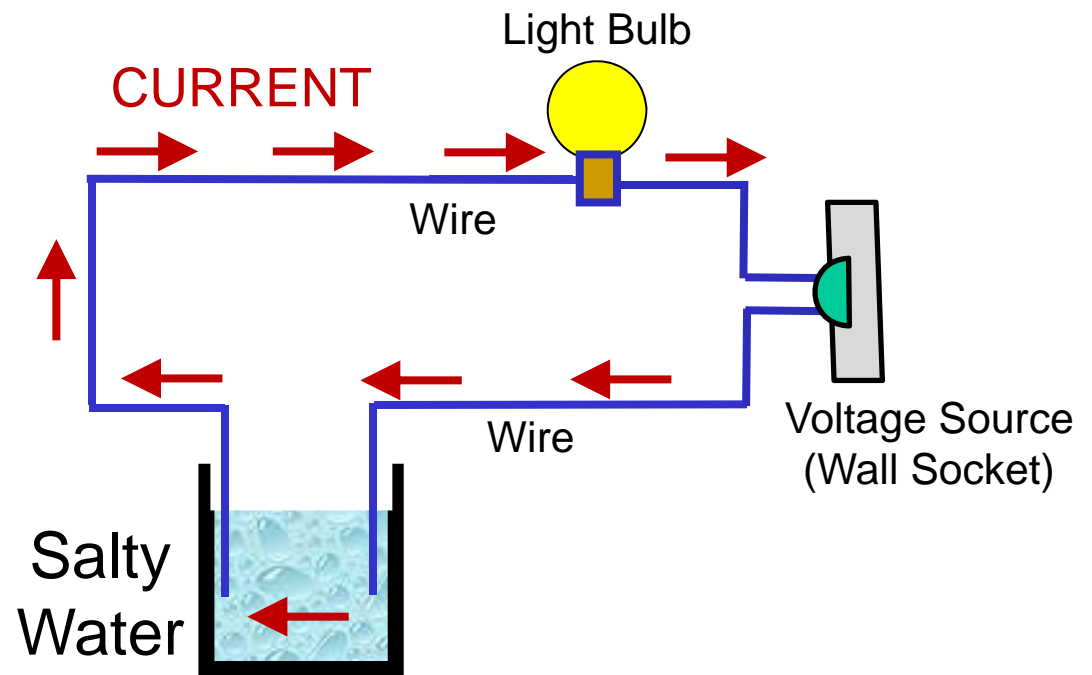
$$\text{Electrical current} = \frac{\text{Voltage}}{\text{Resistance}}$$

Hold Fixed	Change	Result
Voltage	Resistance ↑	Current ↓
Voltage	Resistance ↓	Current ↑
Resistance	Voltage ↑	Current ↑
Resistance	Voltage ↓	Current ↓

Resistance of Water

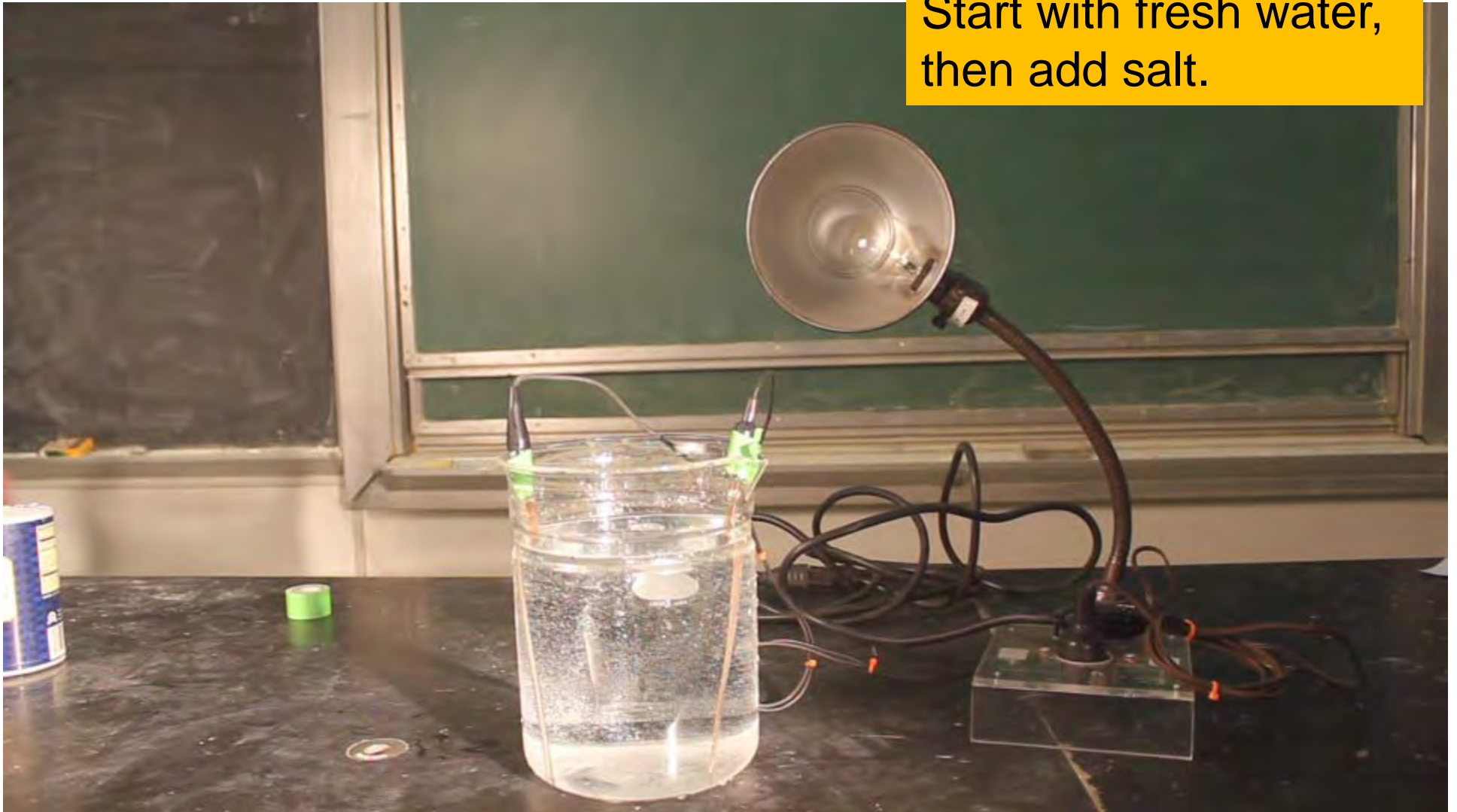
Pure water has very high resistance;
impurities, such as salt, lower resistance.

When salt dissolves the sodium and chlorine atoms are charged (ions). These mobile charges carry the current in the water.



Resistance of Water

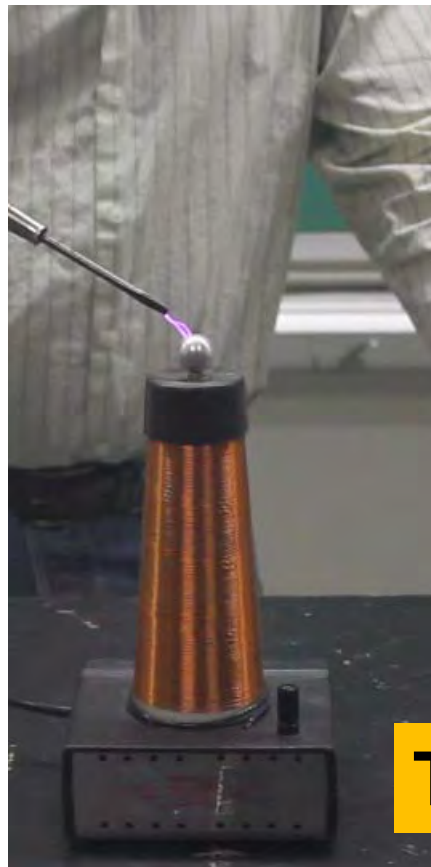
Start with fresh water,
then add salt.



Resistance of Air

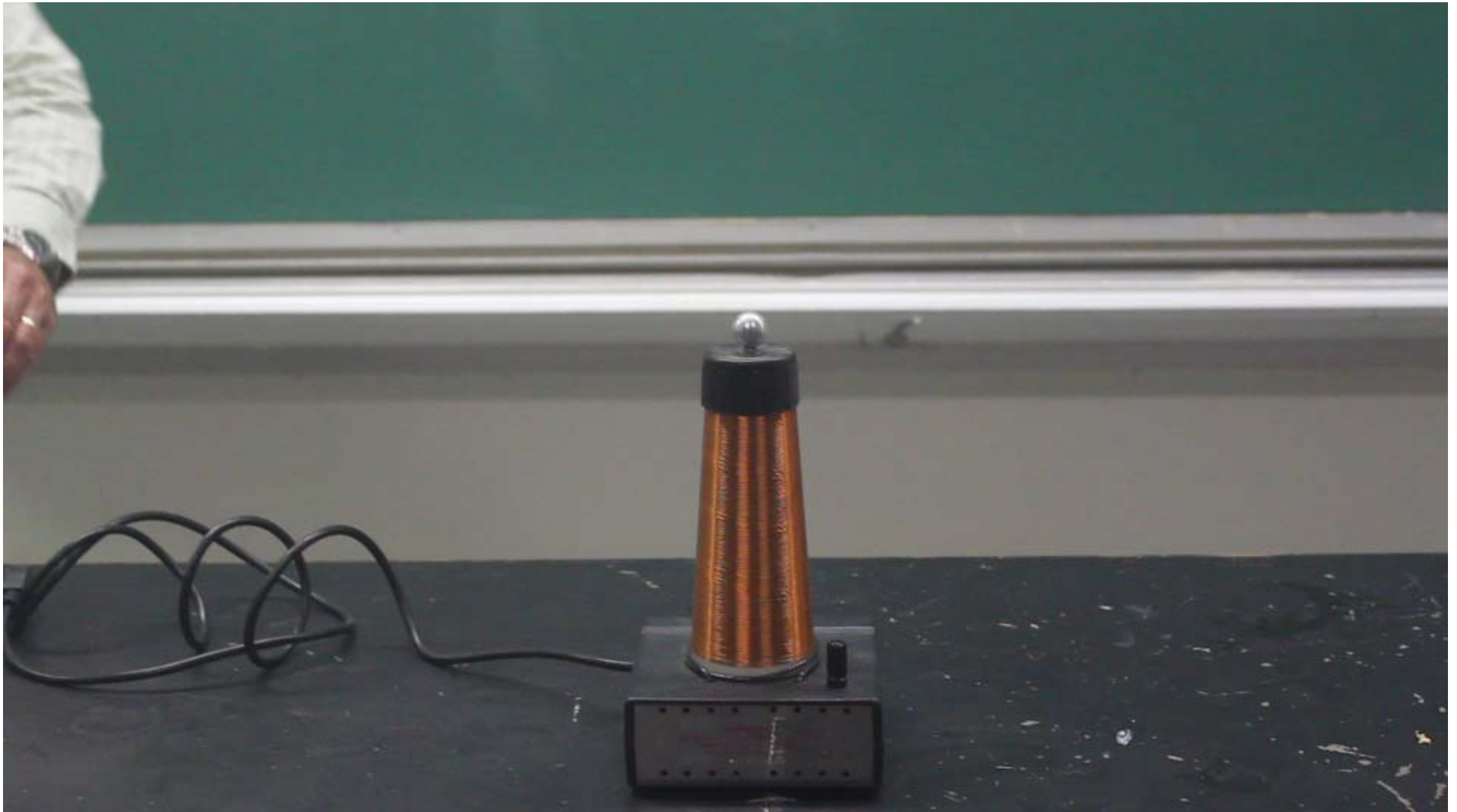
Air is an insulator with a high resistance.

Need a high voltage to produce an electrical current in air.



Tesla Coil

Tesla Coil



Summary

- Electric current is the flow of electrical charges (usually electrons).
- Current depends on voltage and resistance.
- Electrical conductors have low resistance; electrical insulators have high resistance.
- By Ohm's law, for a given voltage the current increases as the resistance decreases.