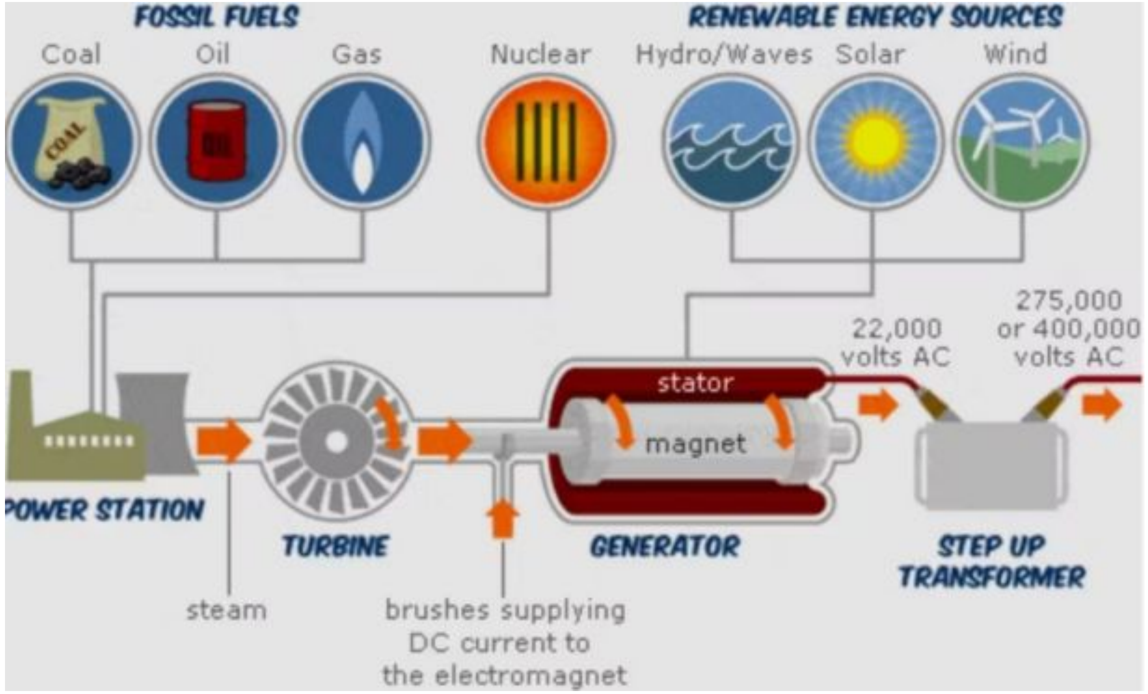
What we like about elettr^{8}O^{6}C^{1}Hemi^{53}I^{16}Stry

WARM-UP

Instructions

BRAINSTORMING

How can we **switch on** a light <u>without</u> using electric current?



INPUT

Activation students

GLOSSARY SELF-MADE

Mentimeter

Search defintion of KEY WORDS on
https://www.merriam-webster.com/

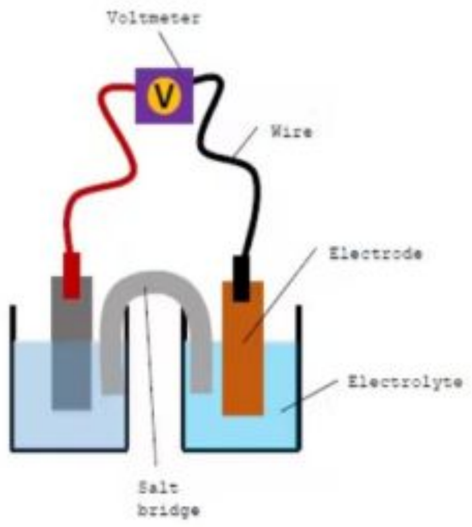
- Daniell cell
- Cathode
- Anode
- Reduction
- Oxidation

Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

INPUT

Reading and comprehension helped by colors

The Daniell Cell



The Daniell Cell pictured, shows the **two** *electrochemical reactions* happening in different reaction *vessels* - we call these **half cells**.

On the *left* side, zinc sits in zinc sulfate; on the *right* side, copper is submerged in copper sulfate.

Both half cells are **connected** by the **electrodes** through a **voltmeter**, and also through the salt bridge which completes the *circuit*.

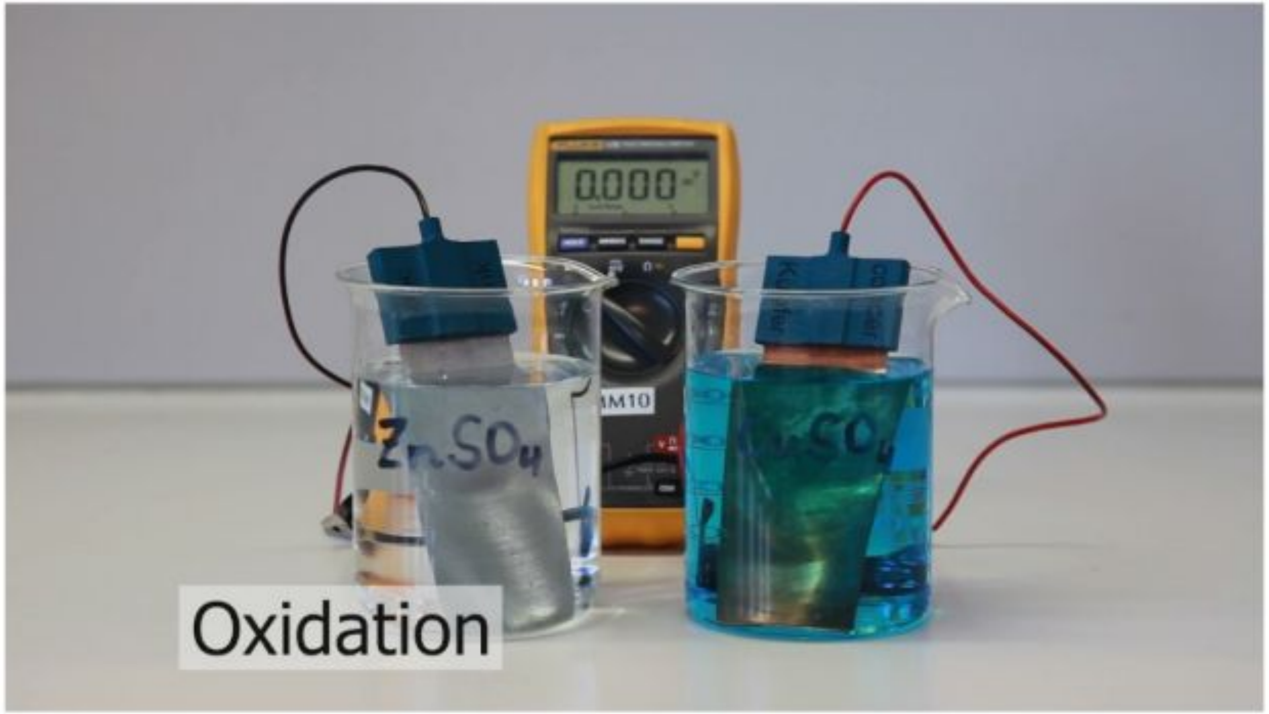
What is happening?

We can work out which way the current flows using the reactivity series: we know already that zinc is **more reactive** than copper. This means that the following reactions are happening:

At the zinc electrode, zinc metal is being **oxidised** according to the following reaction: $Zn \rightarrow Zn^{2+} + 2e^{-}$

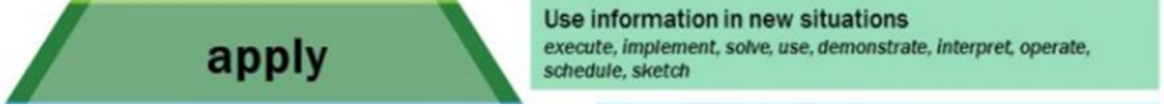
At the copper electrode, copper ions from the electrolyte are being **reduced** to copper: $Cu^{2+} + 2e^{-} \rightarrow Cu$

INPUT



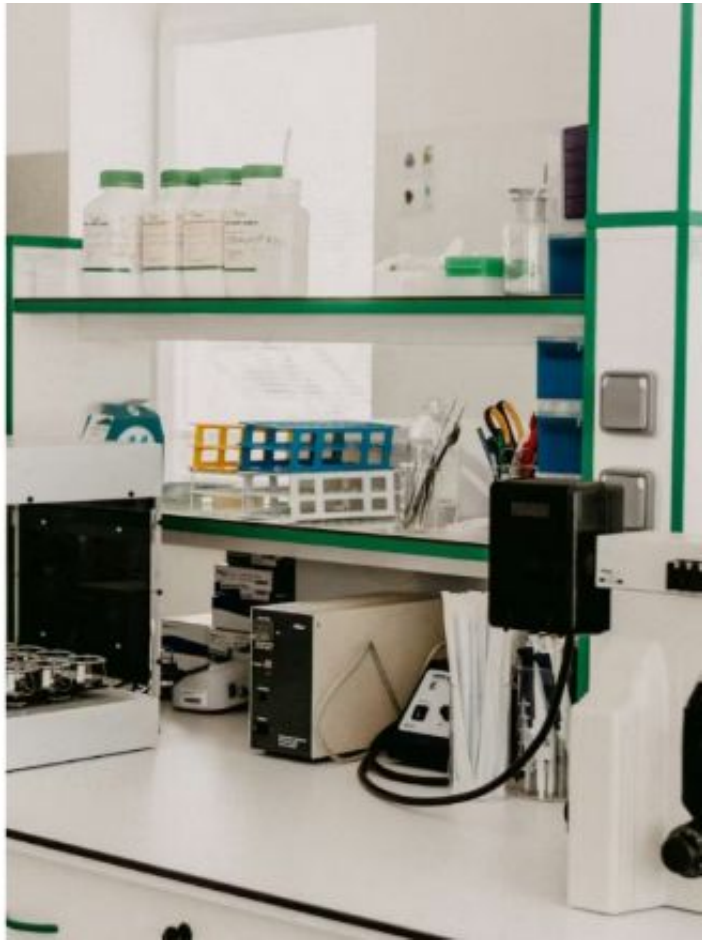
Subtitles can help you!

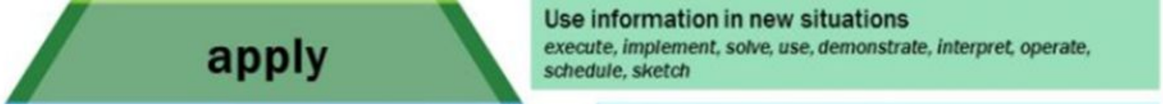
Watching video



PRACTICAL EXPERIENCE

Do it in laboratory!





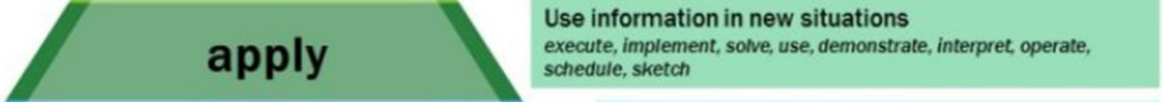
SCAFFOLDING

After watching video and the practical experience, students have to:

- write a list of materials
- answer questions

1. How does the *Daniell cell* generate **electricity**?
2. Write *Daniell cell*'s scheme as a chemist:

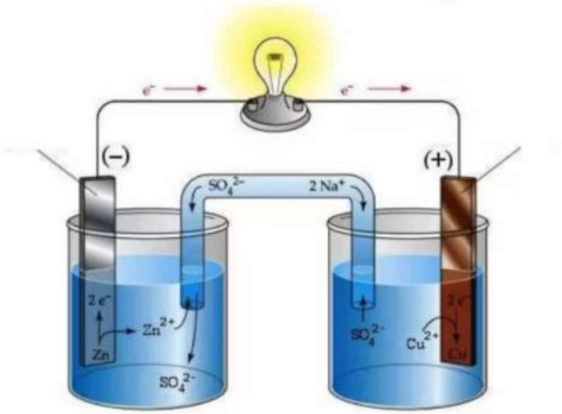
(**-**) *element anode* / ions anode // ions cathode / *element cathode* (**+**)



TASKS

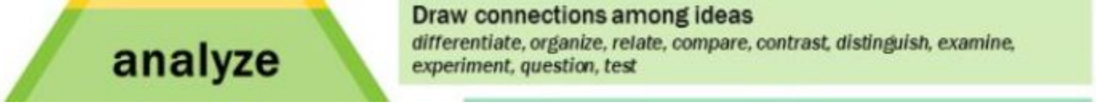
- Visual aids

Complete this scheme and write the reaction under each beaker.



Complete the following diagram.

Keyword	Definition	In the Daniell cell
Anode		
Cathode		
Oxidation		
Reduction		



TASKS

- Applied Maths

$$\overset{+7}{MnO_4^-} + e^- \longrightarrow \overset{+6}{MnO_4^{2-}} \qquad \text{RED}$$

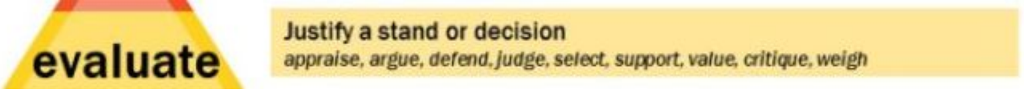
$$\overset{+4}{NO_2} + H_2O \longrightarrow \overset{+5}{NO_3^-} + 2H^+ + e^- \qquad \text{OX}$$

$$MnO_4^- + \cancel{e^-} + NO_2 + H_2O \longrightarrow MnO_4^{2-} + NO_3^- + 2H^+ + \cancel{e^-}$$

Mentimeter

Add *oxidation* and *reduction* reactions. What's the **resulting reaction**?

La risposta corretta è: Zn + Cu(II) → Zn(II) + Cu



TASKS

- Applied Maths

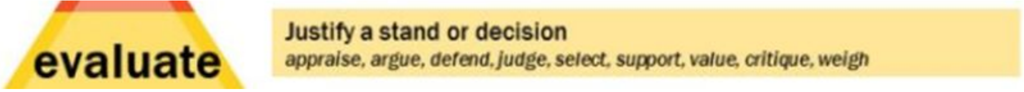
Mentimeter

Calculate **e.m.f.** (= E° cathode - E° anode).

Search **standard reduction potential** (*E°*) on

https://www.pianetachimica.it/giochi/test/Tabella_Potenziali.pdf

- *oxidation reaction*
- reduction reaction



TASKS

- Applied Maths

Data analysis

- → Measure and record the voltage generated
- → Differences with/without a salt bridge
- → Impact of concentration and electrode material

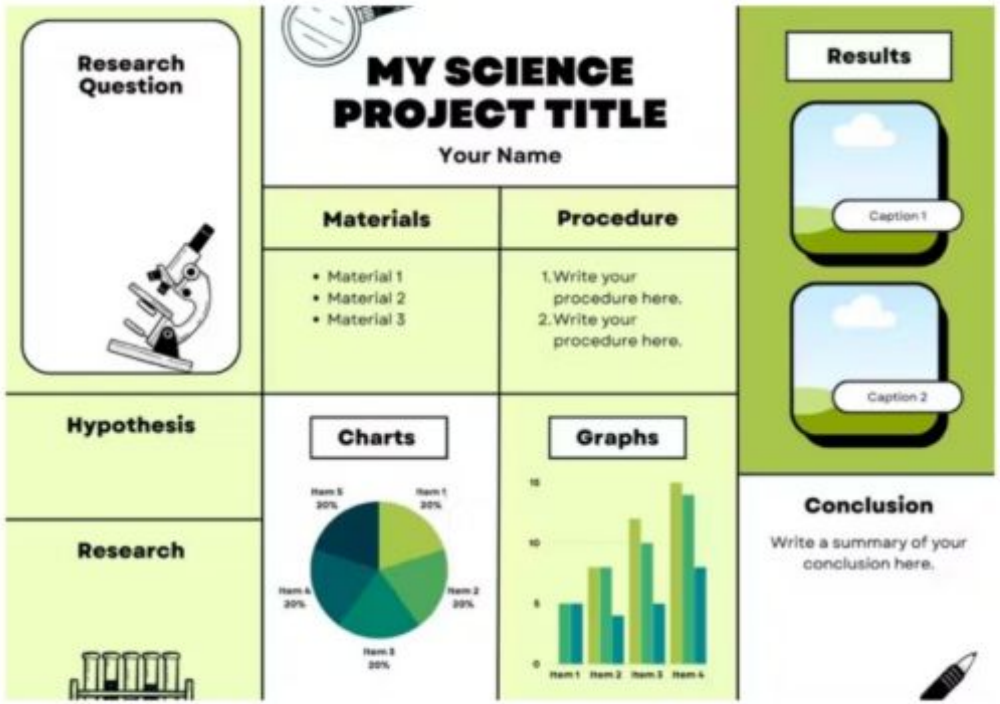
create

Produce new or original work

Design, assemble, construct, conjecture, develop, formulate, author, investigate

TASK: THE LAST, BUT NOT THE LEAST

Create a **scientific poster** to present this experiment.



DEBRIEFING

How familiar are you with non-electric lighting methods?

0 Very familiar

0 Somewhat familiar

0 Not familiar at all

WORK GROUP

- BELLO Mario
- CALDARARO Antonella
- DE BARI Giuseppe
- SPERA Alessandro
- TURI Francesco