



Empowering for Innovation

## Saltwater Battery

### Conventions used in this document:

Blue: Questions from facilitator to children

Brown: Children's anticipated response

Black: Comments, notes, and plan for the facilitator

### Session flow

Sr. No.	Activity	Talking points	Time allotted
1	Introduction	<ul style="list-style-type: none"><li>We are going to make a saltwater battery</li></ul>	15 mins
2	Group formation and worksheet distribution	Assuming you have already explained to them how to use the worksheet. If not please refer ' <a href="#">General instructions for the facilitator</a> '	15 mins
3	Ideation and Material gathering	Students will come up with the design of the project and list of the material required for the completion of the challenge. Here children should have filled the worksheet till the material list.	15 mins
4	Project making	During this time, children will build the project.	45 mins
5	Worksheet completion	It will be difficult for children to complete the worksheet while making the project. So give them extra time to complete the worksheet once the project is completed.	15 mins
6	Final Discussion	Working of saltwater battery	15 mins

The above mentioned is the minimum time you need to give children. Feel free to change the time allotted as per the requirement of the class. This is typically a 2 hr project. You can extend it up to 3 hrs.



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## Introduction

Ask them to go through the instruction sheets first.

They will read the following,

## Challenge 1

*Light an LED using saltwater as a solvent with copper and zinc as electrodes.*

There are different ways in which you can conduct/ generate electricity. Today we are going to learn about electrochemical cells.

So far, what have you used as a power source? **Battery.**

Today we will be making batteries ourselves. Let us make a saltwater battery and understand how it works. For this, you will be using zinc and copper plates.

Let us start making the saltwater battery and learn more about it.

## How to help children when they are stuck using the Inquiry driven approach

It is difficult to use a complete inquiry-driven approach here because students may not have any information about it.

### 1. Connections

Ask them,

What are the terminals on the battery?

**Positive and Negative**

Now you have two metal strips, one may be positive and another negative. Consider glass with saltwater as a battery so each battery has one positive and one negative, how do you think copper and zinc plates should be placed in a glass?

**Each glass will have a Zinc and a copper plate.**

How do you connect two batteries generally?

**Positive is connected to the negative.**

So if each glass is a separate battery, how will the connections look?

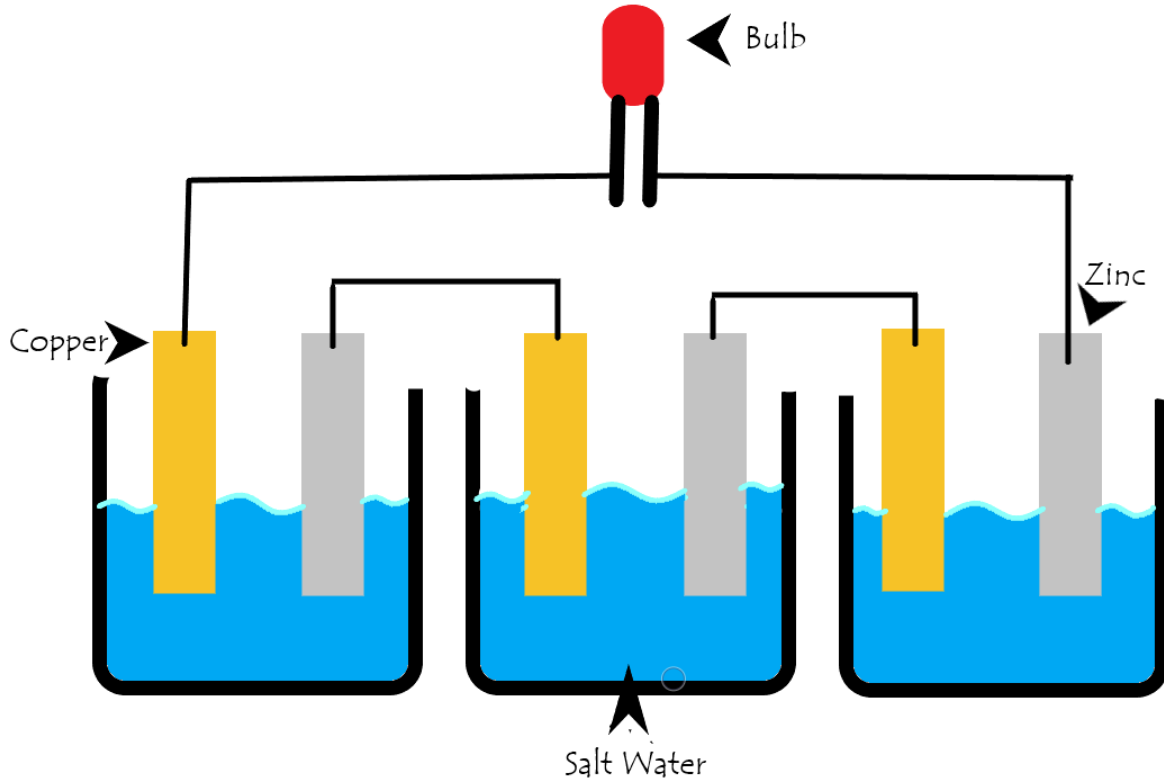
**Zinc and copper will be connected with a wire and both will be placed in a different glass.**

How do you connect an LED/ Motor to the battery?

**Between copper and zinc plate**



Connection for your reference



2. Connections are made but yet LED is not lighting

Ask them to check the voltage across the LED. They can then add a spoonful of salt in each glass and check if the LED is lit or check the voltage again. If the voltage is zero or not increasing after adding salt, there has to be a connection error.

### Why the project may not work

1. Connection error

Make sure the connections aren't loose.

2. LED is not working

Connect the LED with the battery (attach resistor between battery and LED) and check if the LED is working. Make sure positive (longer leg of LED) is connected to copper plate and negative (shorter leg of LED) is connected to the zinc plate.



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## Working

A saltwater battery uses the chemical energy from the redox reactions taking place in the cell to convert it into electrical energy. The electrolyte is a salt and water solution. Here the anode is the negative terminal, and the cathode is the positive terminal.

Oxidation takes place at the anode, where electrons are released.

The electrons that are generated at the zinc anode travel through the external wire and register a reading on the voltmeter. They continue to the copper electrode.

The electrode at which reduction occurs is called the cathode. The cathode gradually increases in mass.

This movement of electrons in a circuit helps generate electricity and light LEDs in our project.

Refer student reference for more information, [here](#).

## Final Discussion

What did you understand while making this project?

We were able to generate electricity with saltwater, copper and zinc plates.

How is this useful?

We can use this to generate electricity.

Here you can share a student's reference document with them.

How does a salt water battery work? (You can decide how much you want to go into the detail for this project)

You can explain the working here.