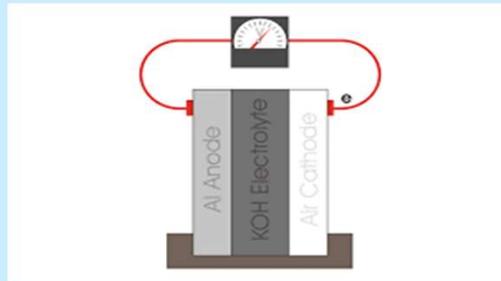
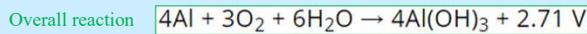
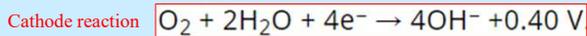


# Aluminium Air Battery

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## What Is An Aluminum-Air Battery?

Aluminum-air batteries (AABs) produce electricity using a salt water or alkali (NaOH, KOH) electrolyte, aluminum of some form, and the oxygen in ambient air. The oxidation of aluminum at the anode and the reduction of oxygen at the cathode form a galvanic cell.



Al-Air Battery (<https://www.electrical4u.com/aluminum-air-battery/>)

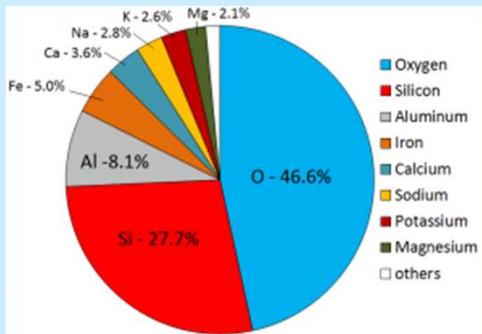
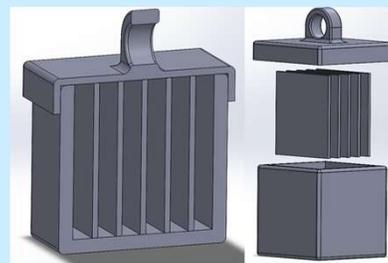


## Components Of The Battery

The battery cells are composed of typical household aluminum foil, a carbon air purifier filter, styrofoam node separators, and salt saturated water. All of these are taped together to form a single cell and sit in a housing case. The carbon air purifier also acts as a diffusion layer by allowing oxygen to enter the battery easier, increasing the energy output.

## The Design

This AAB is housed in a multicellular structure. The availability of multiple cells allows for a higher potential voltage. In our housing, we have a cube structure measuring 27 in<sup>3</sup> with a lid for accessibility along with 5 water sealed slots for cells.



Average elemental proportions in Earth's crust (<https://opentextbc.ca/geology/chapter/3-2-magma-and-magma-formation/>)

## Why Use an Al-Air Battery?

This battery has a very attractive energy density. This battery is also much more sustainable compared to the popular lithium-ion battery as aluminum is much more abundant, making up 8.1% of the material in the earth's crust compared to lithium's 0.002% contribution. Although Al-Air batteries cannot be recharged, the materials that make up the battery are 100% recyclable or easily disposed of with little to no environmental impact and cells can be replaced with ease.

## How Does It Compare To Other Batteries?

AABs are very energy dense, having the second highest practical operating temperature, just below lithium-air batteries. The battery itself is significantly more economical, environmentally friendly, and sustainable compared to alternatives, such as lithium-air batteries. All these advantages allow for the Aluminum-Air battery to be a top contender with other metal-air batteries

Parameters of various metal-air batteries.

Batteries	Theoretical Voltage (V)	Theoretical specific capacity (Ah Kg <sup>-1</sup> )	Theoretical energy density (kWh kg <sup>-1</sup> )	Practical operating voltage (V)
Li-air	3.4	1170	13.0	2.4
Zn-air	1.6	658	1.3	1.0-1.2
Mg-air	3.1	920	6.8	1.2-1.4
Na-air	2.3	687	1.6	2.3
Al-air	2.7	1030	8.1	1.2-1.6

Parameters of various metal-air batteries

(<https://www.sciencedirect.com/science/article/pii/S246802571730081X>)



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