

# U3A Science & Technology



# All about Batteries

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The Batteries are of the sizes- LR 44, 9V, AG 1, SR 521, AG 4, AG 10, G-12-A, SR 83 W, CR 2025, 395/, CR 2016, CR 2032 and CR 2030.



# What is a battery?







A battery consists of  
MORE THAN ONE cells





# So what is a cell?





# 1<sup>st</sup> definition

An electrochemical cell is a device capable of either deriving electrical energy from chemical reactions, or facilitating chemical reactions through the introduction of electrical energy.



## 2<sup>nd</sup> definition

A vessel containing various chemicals which produce electricity as a result of the reactions taking place between these chemicals.





Who invented the  
very first cell?

**Count Allesandro Giuseppe Anastasio Volta** is the man who gave us the word **volt**, our unit for electrical pressure of electromotive force (EMF).

**In 1789** he took a rods of copper and zinc and immersed them both in an acetic acid solution. He had just constructed the first battery cell with the first **electrolyte**.

The copper and zinc rods were the positive and negative electrodes. The acid started to eat away the zinc rod, while the copper rod captured the energy released from the action. An EMF developed between the two **electrodes**. Volta had invented the cell.

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Alessandro Volta was born in Como, Italy in 1745. In 1774, he was appointed as professor of physics at the Royal School in Como.

While at the Royal School, Alessandro Volta designed his first invention the electrophorus in 1774, a device that produced static electricity.

For years at Como, he studied and experimented with atmospheric electricity by igniting static sparks.

In 1779, Alessandro Volta was appointed professor of physics at the University of Pavia and it was while there that he invented his most famous invention, the voltaic pile

One contemporary of Alessandro Volta was Luigi Galvani.

It was Volta's disagreement with Galvani's theory of galvanic responses (animal tissue contained a form of electricity – remember the frog's legs experiments?) that led Volta to build the voltaic pile to prove that electricity did not come from the animal tissue but was generated by the contact of different metals, brass and iron, in a moist environment.



# The combatants



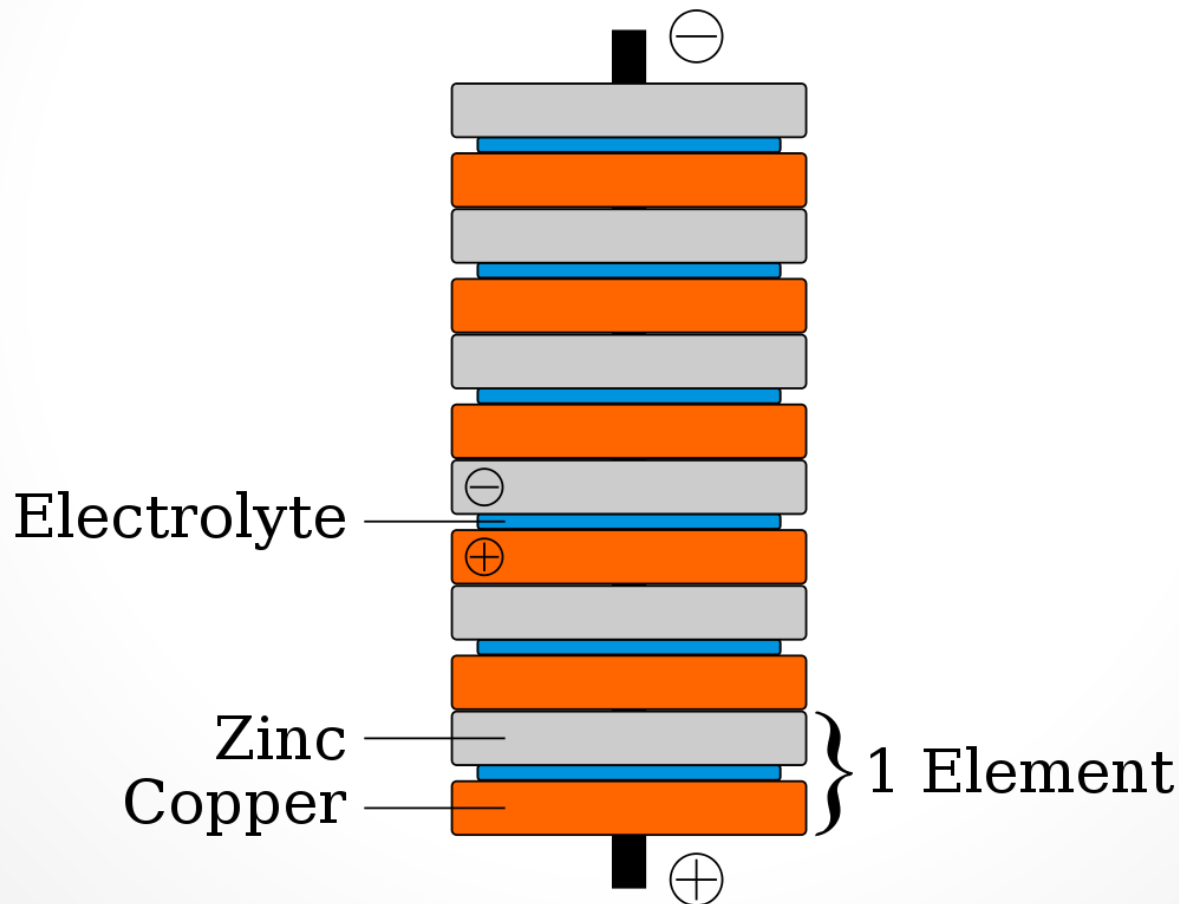
Alessandro Volta\*  
1745 - 1827

(\*Volta also invented the electrophorus  
and discovered methane)

Luigi Galvani  
1737 - 1798



# Schematic construction of a six cell pile



# Volta's pile

A museum example



# Battery history timeline 1789 - today

Date	Event	Comment
1789	Volta's cell	The new age is born
1802	Cruikshank's pile	First easily reproduced pile
1836	John Daniell's improvements	Improves the pile
1859	Planté invents first rechargeable battery	Lead acid
1869	Leclanché develops first wet battery	
1881	Thiebaut's dry battery	Patented
1890	Edison invents rechargeable NiFe cell	
1896	First mass-produced dry battery	National Carbon Company (USA)
1896	The "D" cell is designed	You may think of it as the U2 or HP2 cell. It is the largest 1.5 volt battery



Date	Event	Comment
1899	Invention of the NiCd battery by Jungner	
1910	Commercial production of NiFe batteries	
1914	Edison develops first alkaline battery	
1934	Schlecht and Akermann invent the sintered plate NiCd battery	
1947	Sealed NiCd battery developed	
1956	First 9 volt battery produced	PP3 shape. Needed for transistor radios
1960s	Alkaline batteries commercially produced	

Date	Event	Comment
1970s	Non rechargeable Lithium battery available	
1970s	Maintenance free lead-acid battery available	
1914	Edison develops first alkaline battery	
1976	Philips Research invents the Nickel Metal Hydride (NiMH) battery	
1980s	Nickel Metal Hydride (NiMH) battery improved	
1990s	Nickel Metal Hydride (NiMH) batteries commercially produced	
2000s	Lithium ion – polymer batteries developed	