

Type of cells	Primary cells "Non-rechargeable"			Secondary cells "Rechargeable"	
Name of cell	Daniel cell	Mercury cell	Fuel cell	Lead-acid battery	Lithium-ion battery
Anode	Zinc	Zinc	H ₂ gas "passing through porous carbon layer"	Lead	Lithium graphite "LiC ₆ "
Cathode	Copper	HgO "Mercuric oxide"	O ₂ gas "passing through porous carbon layer"	PbO ₂ "Lead dioxide"	LiCoO ₂ "Lithium cobalt oxide"
Electrolyte	Na ₂ SO ₄	KOH solution	KOH solution	Dil. H ₂ SO ₄	LiPF ₆ "Anhydrous Lithium hexa-fluoro phosphate"
Oxidation reaction	$\text{Zn} \xrightarrow{\text{oxid.}} \text{Zn}^{2+} + 2\text{e}^-$	$\text{Zn}^0 \xrightarrow{\text{oxid.}} \text{Zn}^{2+} + 2\text{e}^-$	$2\text{H}_2 + 4\text{OH}^- \xrightarrow{\text{oxid.}} 4\text{H}_2\text{O} + 4\text{e}^-$	$\text{Pb} + \text{SO}_4^{2-} \xrightarrow{\text{oxid.}} \text{PbSO}_4 + 2\text{e}^-$	$\text{LiC}_6 \xrightarrow{\text{oxid.}} \text{C}_6 + \text{Li} + \text{e}^-$
Reduction reaction	$\text{Cu}^{2+} + 2\text{e}^- \xrightarrow{\text{Red.}} \text{Cu}^0$	$\text{Hg}^{2+} + 2\text{e}^- \xrightarrow{\text{Red.}} \text{Hg}^0$	$\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \xrightarrow{\text{Red.}} 4\text{OH}^-$	$\text{PbO}_2 + 4\text{H}^+ + \text{SO}_4^{2-} + 2\text{e}^- \xrightarrow{\text{Red.}} \text{PbSO}_4 + 2\text{H}_2\text{O}$	$\text{CoO}_2 + \text{Li}^+ + \text{e}^- \xrightarrow{\text{Red.}} \text{LiCoO}_2$
Total red-ox reaction	$\text{Zn} + \text{Cu}^{2+} \xrightarrow{\text{Red-ox}} \text{Zn}^{2+} + \text{Cu}^0$	$\text{Zn}^0 + \text{HgO} \xrightarrow{\text{Red-ox}} \text{ZnO} + \text{Hg}^0$	$2\text{H}_2 + \text{O}_2 \xrightarrow{\text{Red-ox}} 2\text{H}_2\text{O}$	$\text{Pb} + \text{PbO}_2 + 4\text{H}^+ + 2\text{SO}_4^{2-} \xrightarrow{\text{discharge}} 2\text{PbSO}_4 + 2\text{H}_2\text{O}$	$\text{LiC}_6 + \text{CoO}_2 \xrightarrow{\text{discharge}} \text{C}_6 + \text{LiCoO}_2$
E.M.F	1.1V	1.35V	1.23V	2V×6cells = 12V	3V
Cell diagram	$\text{Zn}^0_{(s)} / \text{Zn}^{2+}_{(aq)} // \text{Cu}^{2+}_{(aq)} / \text{Cu}^0_{(s)}$	$\text{Zn}^0 / \text{Zn}^{2+} // \text{Hg}^{2+} / \text{Hg}^0$	$2\text{H}_2^0 / 4\text{H}^+ // \text{O}_2^0 / 2\text{O}^{2-}$	$\text{Pb}^0 / \text{Pb}^{2+} // \text{Pb}^{4+} / \text{Pb}^{2+}$	$\text{Li}^0 / \text{Li}^+ // \text{Co}^{4+} // \text{Co}^{3+}$
Uses :		Earphones , clocks and cameras	Space ships	Car batteries	Mobiles, laptops and modern cars.