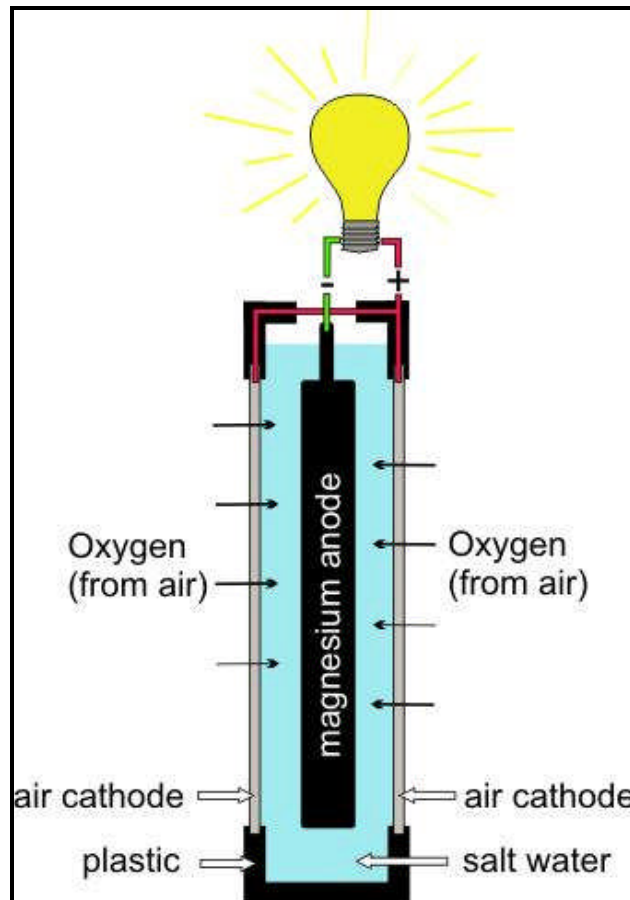


## THE MAFC TECHNOLOGY

The MAFC is a **metal-air fuel cell** that uses a metal (anode) such as magnesium, aluminum or zinc as the fuel immersed in an electrolyte coupled with a gas diffusion cathode to generate a direct current.

### Metal-Air Types

	Magnesium	Aluminum	Zinc
Specific Gravity	1.74	2.70	7.13
SHE	-2.363	-1.662	-0.763
Energy # electrons	2	3	2
Open Circuit voltage	1.7	1.2	1.3
Anode Composition	>90%	99.999%	99.99%
Current capacity Ah/kg	2200	2500 (alloy)	740
Electrolyte	salt water	KOH	KOH
pH electrolyte	6 – 8	13 – 14	13 - 14
Source(s)	seawater, brines limestone, magnesite serpentine	bauxite	zinc sulphides



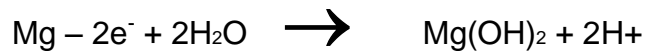
## The Magnesium-Air Chemistry

The **MAFC** has the electrolyte versatility of using a common saline (salt) solution or ocean water. The performance capabilities of the MAFC can be enhanced through the addition of MagPower's hydrogen inhibitors.

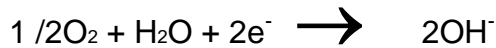
**Magnesium + Oxygen + Water + Salt + Additive → Direct Current**

- Material pure magnesium or magnesium alloys (AM60, AT61)
- Electrolyte tap water, seawater (or urine)
- Additive Hydrogen Inhibitor

**Anode Reaction:**



**Cathode Reaction:**



**Overall Parasitic Reaction:**



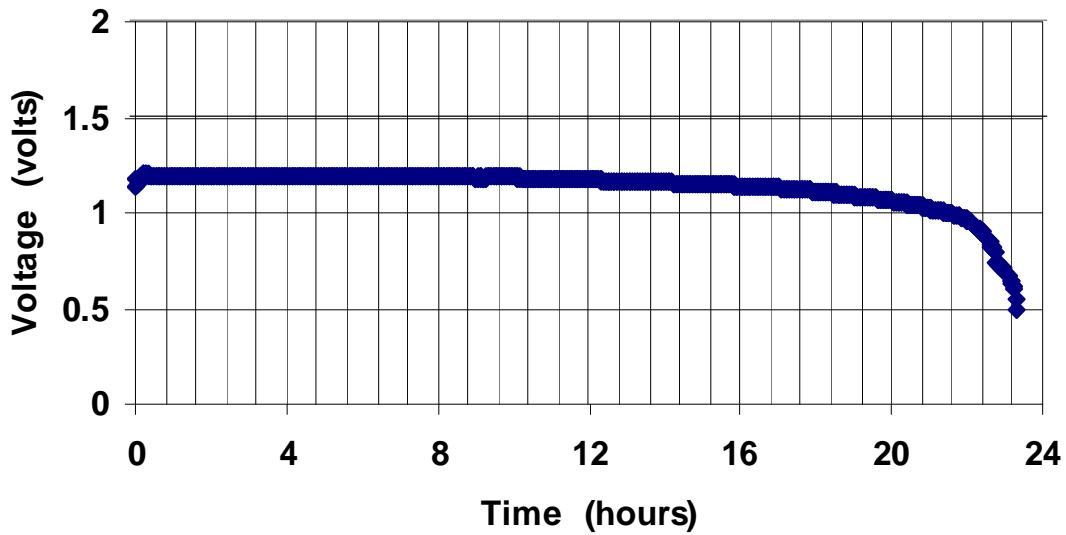
The formation of hydrogen has negative ramifications in the performance of the MAFC. The importance of Hydrogen Inhibition in the Magnesium-air fuel cell:

- Increased power efficiency
- Reduction of cell resistance and/or over voltages due to gassing
- Reduction or elimination of pressure and/or volume increase due to hydrogen gassing resulting in smaller metal-air fuel cells, and batteries
- Improved safety

Due to the corrosion of the magnesium anode and the consumption of water, these components require replacing at intervals.

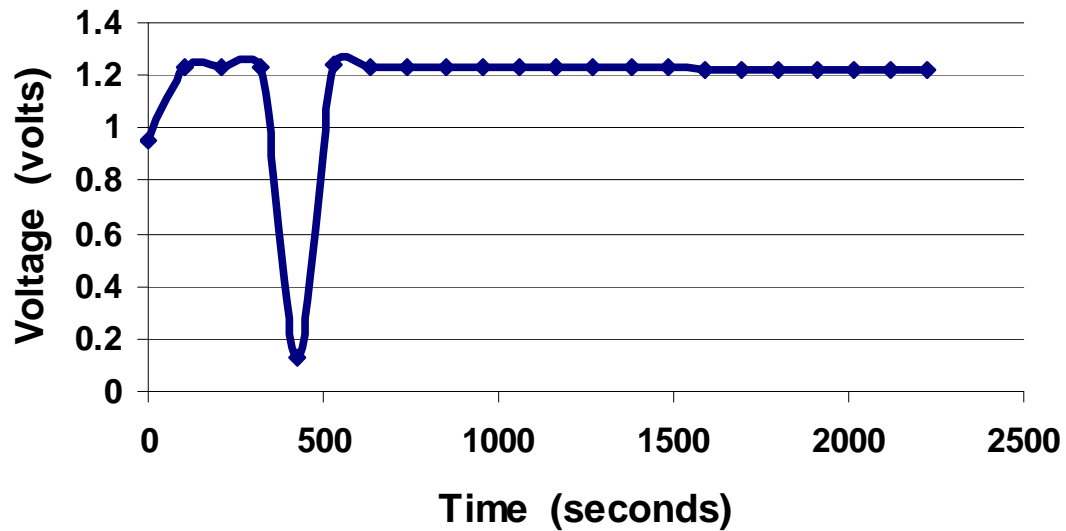
### Discharge Curve – 1 cell at 5 amps

Energy = 108 whrs, Temp: 55C; vol = 0.5 l; wt anode = 140 gms  
cathode surface area = 240 cm<sup>2</sup>



### Short Circuit Graph – 1 cell (5 amps)

short = 212 seconds



## **THE MANUFACTURING TECHNOLOGY**

MagPower has developed a unique cell using the injection molding process. The MAFC's advanced injected mould design is made from plastic (some of which is recycled plastic) which has substantial advantages over other types of energy generation and power storage forms:

1. It is environmentally safe to manufacture and assemble. It creates no toxic substances nor creates disposal concerns. All parts are deemed to be recyclable.
2. It is relatively inexpensive to manufacture and assemble.
3. The MAFC cell design is extremely versatile as the cells can be stacked. The design can be scaled to produce large primary and secondary power systems as well as being used in conjunction with hybrid power systems.
4. The MAFC uses environmentally benign Magnesium (or magnesium alloy) as the fuel source. The magnesium used in this fuel cell is essentially material that is already readily available for other commercial and industrial uses. (the AM60 anode is the same material that automotive manufacturers use).
5. Designed and manufactured to industrial codes and standards.