ALOE-VERA based Electrolytic Solution for environment friendly batteries

Swamini Chopra[1]*, Kavita Pande[2], Abhay Deshmukh[3]

[1]Center of Excellence in Materials and Metallurgy, Maharashtra Institute of Technology, Aurangabad, India

[2]Matverse Vision Pvt. Ltd., Nagpur, India

[3]Energy Devices Lab, Dept. of Physics, R.T.M. Nagpur University, Nagpur, India

ABSTRACT

Electrical energy plays a major role in our daily life and its consumption is also unlimited. There are various ways to store the electricity generated, most common of which is the use of acid batteries and portable dry batteries. The disposal of these batteries creates environmental hazard and are toxic to humans handling them as well. The aim of this project is to develop a non-toxic, environment friendly battery using non-conventional source, i.e. the Aloe-vera plant. The work was done to develop an Aloe-vera gel based electrolyte to generate electricity through metal electrodes like a conventional acid battery. The voltage generated by our set-up was 1.27V after 30 minutes of charging through a 5V charger. The electricity generated was enough for lighting a 1V LED bulb. The future of the project is to develop a higher capacity battery and to scale down the present set-up.

INTRODUCTION

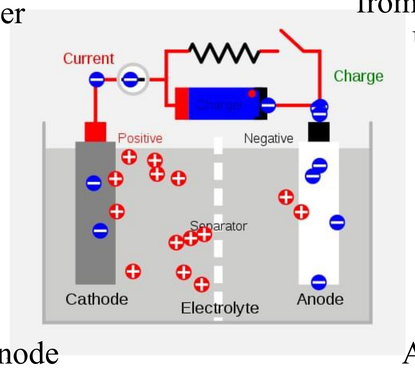
Conventionally used chemical batteries are widely used as an energy source. However, their chemical and material composition and the unsustainable way in which they are disposed can be hazardous!

The lithium from chemical batteries can cause dumpster or landfill fires and can release toxic chemicals. As the batteries accumulate, the chemicals in them can leak out into the soil or water bodies.

Power generated from an ordinary plant and an ingredient that is probably in your cosmetics.

Methodology

The purpose of this research is to make an electrolytic solution from Aloe-Vera plant to use in batteries



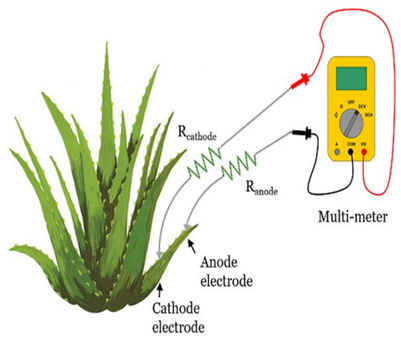
Aloe-vera pulp is extracted manually in two forms: only pulp and pulp along with cover

Zinc (Zn) as anode (negative) and Copper (Cu) as cathode (positive) used for electrolysis process

The voltage output obtained from the device tested on multi-meter

Tools and materials used:

1.Aloe-Vera gel
2.Copper (Cu) plate
3.Zinc (Zn) plate
4.Knife, Scissor or Cutter
5.LED Light
6.Multi-meter
7.5V DC charger
8.Grate or Blender
9.Box with separate sections

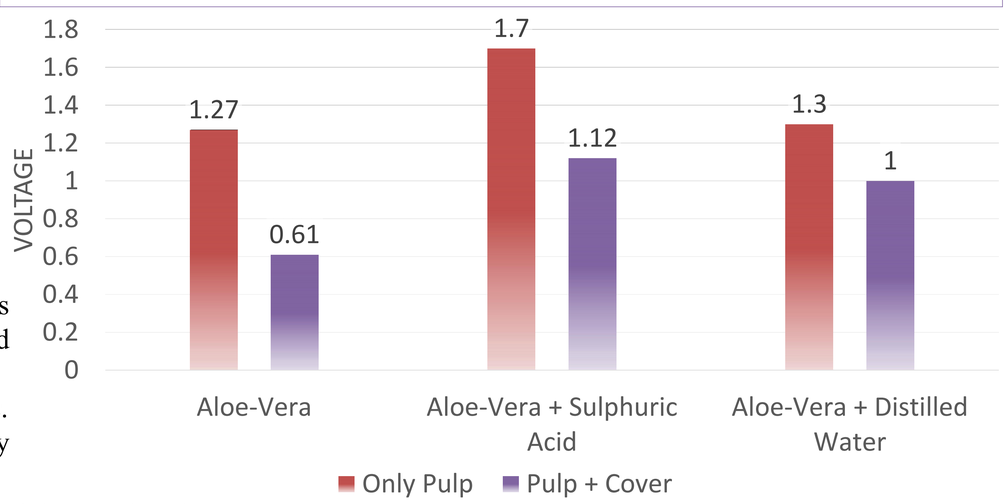


OBJECTIVE

- To develop a non-hazardous electrolyte solution from Aloe-vera plant
- To check voltage generation capacity of electrolyte solution with different concentrations
- To check performance of developed electrolyte with combination of sulfuric acid and distilled water
- To create new avenues for Aloe-vera farming

RESULTS & DISCUSSION

Base	Addition	Concentration	Voltage (V)	
			Only Pulp	Pulp + Cover
Aloe-Vera	-	100	1.27	0.61
Aloe-Vera	H_2SO_4	80/20	1.7	1.12
Aloe-Vera	Distilled water	80/20	1.3	1



CONCLUSION!

- ✓ The Aloe-Vera plant extract has electrical properties and can generate electricity as illustrated. Pure pulp proves to be more efficient than solution made with pulp and cover.
- ✓ The handling of Aloe-vera gel is safe, non-toxic and disposal is also non-hazardous.
- ✓ This product can bring a new revolution in the field of eco-friendly electricity generation.

[REFERENCE]

1. Wang G, Zhang L, Zhang J. A review of electrode materials for electrochemical supercapacitors. Chem. Soc. Rev. 2012;41:797–828.
2. Karnan M, Subramani K, Sudhan N, Ilayaraja N, Sathish M. *Aloe vera* Derived Activated High-Surface-Area Carbon for Flexible and High-Energy Supercapacitors. ACS Appl. Mater. Interfaces 2016;8:35191–202.
3. Perumal P, Sivaraj P, Abhilash KP, Soundarya GG, Balraju P, Selvin PC. Green synthesized spinel lithium titanate nano anode material using Aloe Vera extract for potential application to lithium ion batteries. J. Sci. Adv. Mater. Devices 2020;5:346–53.
4. Rahman S, Carter P, Bhattarai N. Aloe Vera for Tissue Engineering Applications. J. Funct. Biomater. 2017;8:6.
5. Albahri G, Badran A, Hijazi A, Daou A, Baydoun E, Nasser M, et al. The Therapeutic Wound Healing Bioactivities of Various Medicinal Plants. Life Basel Switz. 2023;13:317.