Aqueous Hybrid Ion Batteries

Performance and Construction

Aquion batteries are comprised of a novel Aqueous Hybrid Ion technology that was specifically designed for extremely long cycle life, deep depth of discharge, and extensive fault tolerance. These attributes make AHI batteries an ideal choice for any stationary, deep cycle, long-duration applications.

Aqueous Hybrid Ion Performance: Long Lasting, Rugged, Safe, and Environmentally Friendly

Prototype cells with AHI technology show <10% capacity fade after up to >5,000 cycles at over 50% DOD and >15,000 cycles following the Sandia Nation Lab "partial state of charge" rapid cycling protocol.

Aquion Energy AE1 Battery Stack

AHI batteries do not use corrosive reactions to store electrical energy as is common for other battery chemistries such as lead-acid. As a result, AHI batteries do not need to be immediately charged once they have been discharged. They can be held at a partial state of charge for very long periods of time without damage. Furthermore, AHI batteries do not require a float charge and can operate to 100% DOD with no significant degradation.

AHI batteries are also extremely fault tolerant. They can be short circuited without causing an explosion or fire. It has been shown that AHI batteries can operate after short circuit with only a slight degradation in overall capacity.

AHI batteries are nontoxic, non-corrosive, and contain no heavy metals, making them environmentally benign. They can be disposed of as ordinary trash, although recycling is recommended. The electrolyte is sodium sulfate based salt water with a neutral pH. As a result, electrolyte spillage – a common hazard with both acid and alkaline based battery chemistries – is not a concern with AHI batteries.

Inside An Aqueous Hybrid Ion Battery: Simple, Abundant, Nontoxic Materials

Activated Carbon Anode Pellets

Aqueous Electrolyte: The AHI battery's salt water based electrolyte makes it truly unique, as this is unused in nearly all other battery chemistries.

Sodium Ions: Sodium, a component of household table salt, acts as the primary active ion in the system.

Activated Carbon Anode: Carbon, one of the most abundant materials on the planet, makes up the battery's anode. When the battery is in use, a capacitive interaction takes place on the surface of the carbon.

Manganese Oxide Cathode: Found in some Lithium Ion batteries as well as common alkaline batteries, manganese oxide (MnO_2) makes up the cathode. Energy is stored in this electrode via a non-corrosive intercalation reaction.

Cotton Separator: A simple synthetic cotton separator is used to keep the electrodes from directly contacting each other.