

# Neutral Redox Flow Battery





## Overview

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Can a redox flow battery operate at neutral pH?

We demonstrate an aqueous organic and organometallic redox flow battery utilizing reactants composed of only earth-abundant elements and operating at neutral pH.

What is an aqueous organic redox flow battery (AORFB)?

A high-performance aqueous organic redox flow battery (AORFB) operating upon a pair of judiciously designed anionic viologen and TEMPO derivatives, endows the near-neutral electrolyte systems with compatibility to the cation-exchange membrane (CEM), high cell voltage, excellent cycling stability and record-high power density.

Why is aqueous redox flow battery important?

The need for decarbonization and the intermittency of wind and solar energy drive the quest for grid-scale storage technologies. The aqueous redox flow battery (ARFB) is a promising solution, featuring safety, the decoupling of energy and power capacities and potential long lifetime and low cost.

Are redox flow batteries a viable energy storage solution?

Energy storage systems are crucial in the deployment of renewable energies. As one of the most promising solutions, redox flow batteries (RFBs) are still hindered for practical applications by low energy density, high cost, and environmental concerns.



## Neutral Redox Flow Battery

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### [Mild pH-decoupling aqueous flow battery with practical pH ...](#)

Feb 19, 2024 · The aqueous redox flow battery (ARFB) is a promising solution, featuring safety, the decoupling of energy and power capacities and potential long lifetime and low cost.

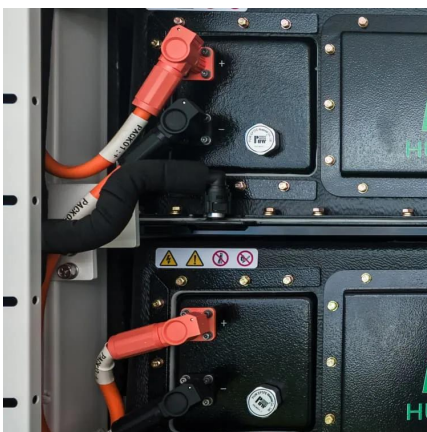
### [A neutral polysulfide/ferricyanide redox flow ...](#)

Oct 22, 2021 · Energy storage systems are crucial in the deployment of renewable energies. As one of the most promising solutions, redox flow ...



### [A Neutral pH Aqueous ...](#)

Feb 7, 2017 · We demonstrate an aqueous organic and organometallic redox flow battery utilizing reactants composed of only earth-abundant elements ...



### [An alkaline S/Fe redox flow battery endowed with high ...](#)

Jan 30, 2024 · The S/Fe redox flow battery (RFB) with abundant sulfide and iron as redox-active species shows promising applications for energy storage. It exhibits ...



### [A neutral polysulfide/ferricyanide redox flow battery](#)

Oct 22, 2021 · For the proposed polysulfide/ferricyanide redox flow battery (PFRFB) system (Figure 1 A), the redox reactants are ultra-abundant and the KCl supporting electrolytes are ...



### [Near to neutral pH all-iron redox flow battery based on ...](#)

Oct 20, 2022 · We demonstrate a redox flow battery at a near to neutral of pH 8.6 using nontoxic iron-coordination compounds as redox carriers in both negative and p...



### [Phenoxazine Radical as a Positive Material for ...](#)

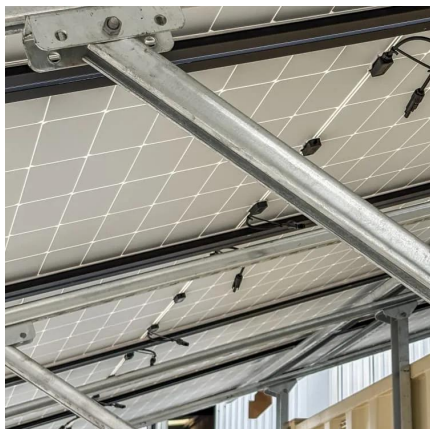
May 5, 2025 · Understanding electron transfer reactions in phenoxazine aqueous-soluble electroactive materials is crucial for developing flow ...





### [A Low-Cost Neutral Aqueous Redox Flow Battery with ...](#)

Nov 26, 2021 · A neutral aqueous tin-based flow battery is proposed by employing  $\text{Sn}^{2+}/\text{Sn}$  as active materials for the negative side,  $[\text{Fe}(\text{CN})_6]^{3-}/[\text{Fe}(\text{CN})_6]^{4-}$  as active materials for ...



### [High-Power Near-Neutral Aqueous All Organic Redox Flow Battery ...](#)

Aug 23, 2022 · A high-performance aqueous organic redox flow battery (AORFB) operating upon a pair of judiciously designed anionic viologen and TEMPO derivatives, endows the near ...

### [Aqueous organic and redox-mediated redox flow batteries: a ...](#)

Jun 1, 2020 · Redox flow batteries (RFBs) are among the most investigated technologies for large-scale energy storage applications. Since the first commercialization of all-vanadium RFB ...



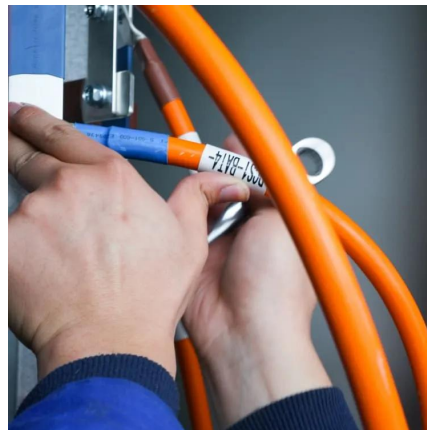
### [Progress and prospects of pH-neutral aqueous organic redox flow ...](#)

Sep 1, 2024 · Aqueous organic redox flow batteries (AORFBs), which exploit the reversible electrochemical reactions of water-soluble organic electrolytes to store electricity, have ...



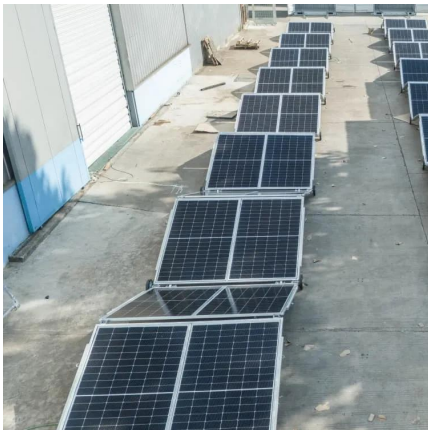
### [A Neutral pH Aqueous Organic-Organometallic Redox Flow Battery ...](#)

Feb 7, 2017 · We demonstrate an aqueous organic and organometallic redox flow battery utilizing reactants composed of only earth-abundant elements and operating at neutral pH. The ...



### [Redox Targeting-based Neutral Aqueous Flow Battery with...](#)

Jul 20, 2023 · Abstract Neutral aqueous flow batteries with common traits of the redox flow batteries, such as the independence of energy and power, scalability and operational flexibility, ...



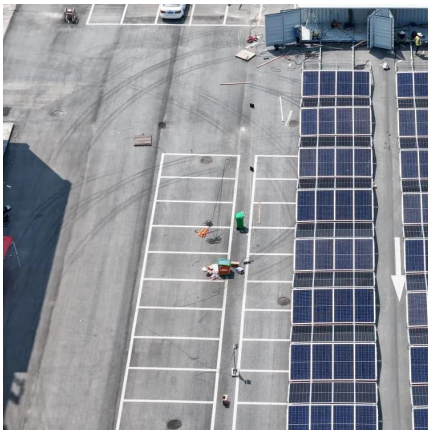
### [A neutral pH all-polymer redox flow battery employing...](#)

Mar 10, 2024 · Aqueous all-polymer redox flow batteries (APRFBs) working with size exclusion membranes are safe, low-cost, scalable solutions for energy storage appl...



### [A tungsten polyoxometalate mediated ...](#)

May 19, 2025 · As a promising large-scale energy storage device, aqueous redox flow batteries face challenges with water splitting. Here, authors ...





## Phenoxazine Radical as a Positive Material for Neutral pH Aqueous Flow

May 5, 2025 · Understanding electron transfer reactions in phenoxazine aqueous-soluble electroactive materials is crucial for developing flow battery (FB) electrolytes, especially for the ...



### [A 1.51 V pH neutral redox flow battery ...](#)

Mar 13, 2019 · Aqueous redox flow batteries using low-cost organic and inorganic active materials have received growing interest for sustainable ...



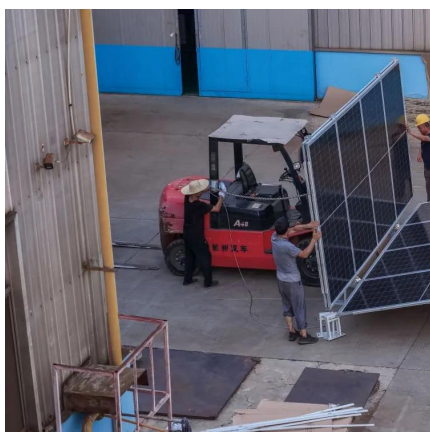
### [Near Neutral pH Redox Flow Battery with Low ...](#)

Abstract A highly stable phosphonate-functionalized viologen is introduced as the redox-active material in a negative potential electrolyte for aqueous ...



### [A pH-Neutral, Aqueous Redox Flow Battery ...](#)

Jul 13, 2020 · An aqueous redox flow battery using PEGylated micellar anthraquinone anolyte and potassium ferricyanide catholyte delivered an ...







### High performance and long cycle life neutral zinc-iron flow batteries

Jan 1, 2022 · A neutral zinc-iron redox flow battery (Zn/Fe RFB) using  $K_3Fe(CN)_6$  /  $K_4Fe(CN)_6$  and  $Zn/Zn^{2+}$  as redox species is proposed and investigated. Both experimental and ...



### High-Power Near-Neutral Aqueous All ...

Aug 23, 2022 · A high-performance aqueous organic redox flow battery (AORFB) operating upon a pair of judiciously designed anionic viologen ...

### Near Neutral pH Redox Flow Battery with Low Permeability and ...

Abstract A highly stable phosphonate-functionalized viologen is introduced as the redox-active material in a negative potential electrolyte for aqueous redox flow batteries (ARFBs) operating ...



### A high-capacity and ultra-stable neutral all-iron redox flow battery

Dec 1, 2025 · We demonstrate an aqueous organic and organometallic redox flow battery utilizing reactants composed only of earth-abundant elements and operating at neutral pH.





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