

# **All-iron liquid flow battery electrolyte**





## Overview

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What is an iron-based flow battery?

Iron-based flow batteries designed for large-scale energy storage have been around since the 1980s, and some are now commercially available. What makes this battery different is that it stores energy in a unique liquid chemical formula that combines charged iron with a neutral-pH phosphate-based liquid electrolyte, or energy carrier.

Are all-liquid flow batteries suitable for long-term energy storage?

Among the numerous all-liquid flow batteries, all-liquid iron-based flow batteries with iron complexes redox couples serving as active material are appropriate for long duration energy storage because of the low cost of the iron electrolyte and the flexible design of power and capacity.

Can iron-based aqueous flow batteries be used for grid energy storage?

A new iron-based aqueous flow battery shows promise for grid energy storage applications. A commonplace chemical used in water treatment facilities has been repurposed for large-scale energy storage in a new battery design by researchers at the Department of Energy's Pacific Northwest National Laboratory.

Why is electrolyte engineering important for all-iron flow batteries?

For all-iron flow batteries, electrolyte engineering is particularly important to mitigate HER, which competes with iron redox reactions. Additionally, optimizing carbon-based electrodes through surface modifications or catalyst coatings can enhance charge transfer efficiency.



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All-Liquid Iron Flow Battery Is Safe, ...

Apr 16, 2024 · All-Liquid Iron Flow Battery Is Safe, Economical What makes this battery different is that it stores energy in a unique liquid chemical ...

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Low-cost all-iron flow battery with high performance ...

Oct 1, 2022 · Among the numerous all-liquid flow batteries, all-liquid iron-based flow batteries with iron complexes redox couples serving as active material are appropriate for long duration ...

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Aqueous iron-based redox flow batteries for large-scale ...

May 31, 2025 · Additionally, all-soluble iron-based ARFBs face limitations in redox species solubility and electrolyte stability. To address these issues, various strategies have been ...

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Iron liquid flow battery energy storage system

environmentally friendly all-iron hybrid flow battery. A flow battery is an easily rechargeable system that stores its electrolyte--the material that provides energy--as liquid in external tanks. Currently, ...

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All-Liquid Iron Flow Battery Is Safe, Economical

Apr 16, 2024 · All-Liquid Iron Flow Battery Is Safe, Economical What makes this battery different is that it stores energy in a unique liquid chemical formula that combines charged iron with a ...

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High-Stable All-Iron Redox Flow Battery with ...

Aug 28, 2024 · Abstract All-soluble all-iron redox flow batteries (AIRFBs) are an innovative energy storage technology that offer significant financial ...

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Low-cost all-iron flow battery with high performance ...

Feb 26, 2024 · Benefiting from the low cost of iron electrolytes, the overall cost of the all-iron flow battery system can be reached as low as \$76.11 per kWh based on a 10 h system with a ...

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New all-liquid iron flow battery for grid energy storage

Aug 11, 2025 · Iron-based flow batteries designed for large-scale energy storage have been around since the 1980s, and some are now commercially available. What makes this battery ...

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PNNL Researchers Develop All-Liquid Iron Flow Batteries for ...

Mar 27, 2024 · While iron-based flow batteries have been around for decades, this iteration has the ability to store energy in a unique chemical formula comprised of charged iron and a ...

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New all-liquid iron flow battery for grid energy storage

Mar 25, 2024 · A new iron-based aqueous flow battery shows promise for grid energy storage applications.

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Hydrotrope-enabled high concentration aqueous electrolytes ...

Dec 4, 2025 · Iron metal batteries are hindered by poor reversibility and hydrogen evolution. Here, authors introduce a urea-based hydrotrope to create a high-concentration ferrous sulfate ...

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High-Stable All-Iron Redox Flow Battery with Innovative ...

Aug 28, 2024 · Abstract All-soluble all-iron redox flow batteries (AIRFBs) are an innovative energy storage technology that offer significant financial benefits. Stable and affordable redox-active ...

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