Environmental impact assessment of alkaline manganese battery production

What is the environmental impact of alkaline batteries?
This analysis shows that for CED, GWP, and resources, the greatest environmental impact of alkaline batteries comes from the materials production of manganese dioxide. For all three of these metrics, approximately 1/3 of the total environmental impact from production comes from a single material.

How do network models and life cycle assessment methods affect alkaline batteries?
Network models and life cycle assessment methods enable the evaluation of various end-of-life collection and treatment scenarios for alkaline batteries. The study employs life-cycle assessment techniques in accordance with the ISO 14040 standard.

Are alkaline manganese and carbon zinc batteries recyclable?
With the alkaline manganese and carbon zinc batteries, the questions revolve more around the economics of the collection and recovery processes. Obviously collection and recycling of a spent battery prevents the entry of the majority, probably greater than 98%, of the battery's weight into the environment after use.

What is an alkaline battery life cycle assessment?
For the alkaline battery life cycle assessment, each phase of the life cycle is identified. Following this, materials and energy are quantified and environmental impacts are calculated for each phase.

Does recycling affect the life cycle of alkaline batteries?
For the purposes of the baseline it is assumed that the burdens and benefits of recycling are directly applicable to the life cycle of these materials that are directly related to alkaline batteries.

How does battery mineral production affect the environment?
Battery mineral production causes impacts on the environment and human health,which may increase the probability of supply restrictions imposed by exporting countries. As the largest battery producer,assessing the environmental impacts of China's battery-related minerals and technologies is crucial.

This assessment examines both rechargeable and non-rechargeable batteries, and includes lead acid, nickel cadmium, nickel metal hydride, lithium ion, carbon zinc and alkaline manganese...

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This mini review aims to integrate currently reported and emerging contaminants present on batteries, their potential environmental impact, and current strategies for their detection as evidence for policy and regulation.

Sustainable battery production with low environmental footprints requires a systematic assessment of the entire value chain, from raw material extraction and processing to battery production and recycling.

Environmental Impact (EI):As shown in Table 1, this paper references the methods developed by Graedel et al. and Manjong et al., using the Life Cycle Assessment (LCA) approach to evaluate the environmental impacts generated during the production of battery materials (Graedel et al., 2015; Manjong et al., 2023).

Increasing renewable mix decreases environmental impact of use phase in battery production. NCA battery more environmentally friendly than lead acid batteries. (Han et al., 2023) 2023: Examine sustainability of 3 types of batteries: Amongst the batteries, vanadium redox flow batteries have highest carbon emissions per MWh. Usage phase of production ...

Nonetheless, life cycle assessment (LCA) is a powerful tool to inform the development of better-performing batteries with reduced environmental burden. This review explores common practices in lithium-ion battery LCAs and makes recommendations for how future studies can be more interpretable, representative, and impactful.

In this paper, based on the practice of manganese production in China, a preliminary life cycle assessment (LCA) of the electrolytic manganese industry is provided, and an analysis of its environmental impact is carried out. A comparison is ...

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Consequently, researchers explored the use of organic acids and bioleaching to reduce environmental impact (Jiang et al., 2023).Nevertheless, each approach presents limitations, organic acid leaching often requires the addition of extra reducing agents, such as H 2 O 2 (Fan et al., 2020).While bioleaching is characterized by prolonged reaction durations ...

To summarize the full life cycle implications of alkaline batteries, the production of raw materials dominates the life cycle with the transport of those raw materials to manufacturing having a minimal environmental impact as shown in the figures below using the proxy environmental impact metric, CED.

o Materials production, rather than end-of-life disposal, dominates the life cycle environmental impact of alkaline batteries. o Environmental impacts of end -of-life treatment involves benefits and burdens. o Net impacts for cumulative energy demand are a burden and are higher than current MSW disposal for most recycling scenarios .

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For a world annual production estimate of 4 billion AA alkaline batteries, the EOL potential findings estimate energy savings and CO2 footprint reduction of about 6.2*10¹5 J and 3.75*108CO2 ...

Hugh Morrow. International Cadmium Association 9222 Jeffery Road Post Office Box 924 Great Falls, VA 22066-0924 USA. Abstract. Total life cycle analyses may be utilized to establish the relative environmental and human health impacts of battery systems over their entire lifetime, from the production of the raw materials to the ultimate disposal of the spent battery.

Results show that particulate pollution from nickel, cobalt, and manganese production exceeds CO 2 emissions, whereas the reverse is true for other battery materials. Battery technologies ...

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