

Zn recovery from spent alkaline batteries using an environmental friendly approach

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Consume of alkaline batteries in the world is increasing and the destination of spent batteries is a concern. Recycling metals from spent batteries could be interesting to decrease the amount of batteries sent to landfill or incineration and for the maintenance of mineral resources. The aim of this work was to recover Zn selectively from spent alkaline batteries using environmental-friendly techniques. Acid leaching was used to extract Zn from spent alkaline batteries. Conventional, microwave- and ultrasound-assisted leaching was tested. Assisted leaching techniques were applied in order to improve: less leaching time and concentration of acid, higher Zn extraction and a higher selectivity of Zn over Mn. Besides Zn, Mn is the major metal present in spent alkaline batteries. For conventional leaching, the best result was 90% of Zn extraction (H_2SO_4 1.5 mol/L, 3 h, 80°C). The use of microwave- and ultrasound assisted leaching increased the extraction of Zn for 96% (1 cycle, 30 s, H_2SO_4 1 mol/L) and 92% (2 min, 0.1p 20% amplitude, H_2SO_4 1 mol/L), respectively. Assisted leaching techniques allowed recovering a high amount of Zn with a smaller concentration of acid (H_2SO_4 1 mol/L versus 1.5 mol/L) and much less time (30s and 2 min for microwave and ultrasound versus 3h) than used in conventional leaching. Both approaches showed to be interesting due to the high Zn removal, the low acid concentration needed and the short duration process. However, ultrasounds had better selectivity, resulting in a Zn solution with higher purity grade (83.3%).

Biography

S Maryam Sadeghi has completed her Master's from Mazandaran University of Islamic Republic of Iran and has worked for 20 months as a Researcher in Porto University. She is pursuing PhD in the field of Environmental Engineering from Porto University. She has published 4 papers in reputed journals.

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