



“Gheorghe Asachi” Technical University of Iasi, Romania



SINGLE- AND MULTI-STEP WET LEACHING FOR THE ASH REMOVAL OF SPENT CATHODE CARBON

**Ruixiang Cao¹, Wei Li¹, Zhaoxu Li¹, Xueying Zhao¹, Bo Zeng⁴, Yongjun Jiang³,
Wenxin Zhao⁴, Mingjie Zhang⁴, Yizhao Li², Chao Yang^{1*}**

¹Key Laboratory of Oil and Gas Fine Chemicals, Ministry of Education & Xinjiang Uygur Autonomous Region, School of Chemical Engineering, Xinjiang University, Urumqi, Xinjiang Uygur Autonomous Region, 830017

²University of Electronic Science and Technology of China Yangtze River Delta Research Institute (Huzhou), Huzhou, Zhejiang Province, 313001

³Xinjiang New Energy (Group) Environmental Development Co., Ltd., Urumqi, Xinjiang Uygur Autonomous Region, 830063

⁴Xinjiang New Energy (Group) Zhundong Environmental Development Co., Ltd., Zhundong Economic and Technological Development Zone, Xinjiang Uygur Autonomous Region

Abstract

Spent cathode carbon is hugely generated from exhausted aluminum electrolysis cell, and its safe treatment has aroused great attention because of environmental and resource requirements. Herein, spent cathode carbon has been treated by different single- and multi-step wet leaching processes. The raw and leached spent cathode carbon samples were characterized by XRF and XRD to track variations of the elemental and crystal phase compositions. Despite a limited increase in the de-ashing efficiency, the water-acid-caustic three-step leaching achieved a lower level of soluble fluoride in the solid residue, in comparison to single-step acid leaching. In addition, the sequence of three-step leaching processes had an impact on the de-ashing efficiency of spent cathode carbon.

Key words: ash removal, combination leaching, fluoride, spent cathode carbon

Received: July, 2025; Revised final: December, 2025; Accepted: January, 2026
