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Recycling of Electrolyzer Spent Carbon-Graphite Lining with Aluminum Fluoride Regeneration.

Abstract: The spent lining of aluminum electrolyzer is one of the most environmentally hazardous wastes of the aluminum industry due to its content of up to 0.2 wt.% cyanide and up to 40 wt.% fluorides. The majority of spent lining is accumulated near aluminum plants in specially equipped landfills, where it can interact with water and air, with formation of toxic compounds and alkaline solutions that could lead to ground water contamination. At the same time, spent lining is of specific value due to presence of fluoride and up to 30 wt. % carbon. Known technology for processing spent lining with preparation of cryolite in operation at some aluminum plants has lost its importance after introduction of dry gas cleaning and a change-over to electrolysis technology using acidic electrolytes. This has led to a substantial reduction of cryolite requirement. Therefore, at present more attention is devoted to technology for producing aluminum fluoride, including from spent lining. This article provides a brief review of known technology for processing aluminum electrolyzer spent lining. Technology is provided for preparing aluminum fluoride product containing fluorine of 55-58 wt. %; thus, there is a reduction in fresh AIF consumption of about 4-6 kgm Al. Laboratory test results are provided. [ABSTRACT FROM AUTHOR]
Recycling of Electrolyzer Spent Carbon-Graphite Lining with Aluminum Fluoride Regeneration.

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RECYCLING OF ELECTROLYZER SPENT
CARBON-GRAFITE LINING WITH
ALUMINUM FLUORIDE REGENERATION

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The spent lining of aluminum electrolyzer is one of the most environmentally hazardous wastes of the aluminum industry due to its content of up to 0.2 wt.% cyanide and up to 40 wt.% fluorides. The majority of spent lining is accumulated near aluminum plants in specially equipped landfills, where it can interact with water and air, with formation of toxic compounds and alkaline solutions that could lead to ground water contamination. At the same time, spent lining is of specific value due to presence of fluoride and up to 30 wt.% carbon. Known technology for processing spent lining with preparation of cryolite in operation at some aluminum plants has lost its importance after introduction of dry gas cleaning and a change-over to electrolysis technology using acidic electrolytes. This has led to a substantial reduction of cryolite requirement. Therefore, at present more attention is devoted to technology for producing aluminium fluoride, including from spent lining. This article provides a brief review of known technology for processing aluminum electrolyzer spent lining. Technology is provided for preparing aluminium fluoride product containing fluorine of 55–59 wt.%; thus, there is a reduction in fresh AlF₃ consumption of about 4–6 kg/ton Al. Laboratory test results are provided.

Keywords: aluminum electrolyzer, spent lining, utilization, aluminum fluoride.
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