

## SECONDARY ALUMINIUM PRODUCTION AND PROCESSING

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**Введение.** Aluminium is a widely used metal with a multitude of applications in various industries, including construction, transport, and space industries. According to calculations of the International Aluminium Institute, almost 1 billion tons of aluminium have been produced worldwide since 1880, and three-quarters of this total volume are still in use. About 35% is used in the construction of buildings and structures, 30% in electrical cables and equipment, and 30% in transport [1]. With the increasing demand for aluminium products, the need for sustainable and efficient methods of production and processing has become increasingly important. Significant disadvantages of primary aluminium production are labor-intensive technologies, negative environmental impact and high energy consumption. Recycling aluminium is much more environmental and economical friendly process. It requires only 5% of electricity from the total production of primary metal, including obtaining alumina from aluminium ores and aluminium from alumina [2]. The metal can be melted down and reformed indefinitely without loss of quality. Due to these properties, secondary aluminium production, processing, and recycling have emerged as vital components of the aluminium industry, offering significant environmental and economic benefits.

**Основная часть.** The process of recycling aluminium starts with collecting the raw materials. The primary source of raw materials for recycling aluminium is used aluminium products, such as cans, foil, and packaging materials. Once the aluminium can is collected for recycling, the efficiency of the combined recycling process (sorting, reprocessing and thermal processing) is 90% [3].

Collected waste and aluminium scrap can be sorted and then melted. Different types of furnaces for melting aluminium scrap are used: electric, reverberatory, rotary and crucible. Choice of furnace type depends on the initial metal content in the scrap, type and content of impurities, geometry of the scrap, frequency of change in the alloy composition, operating conditions, energy cost, and desired product quality. After melting, the refining process starts, which includes the metal-cleaning and degassing stages prior to casting. Several techniques can be used to improve the melt cleanliness, such as flux treatments, degassing, and others. Then the metal is poured into blanks for rolling or extrusion. The desire of industrial enterprises to continue working in this direction makes aluminium production much eco-friendlier.

Aluminium recycling has a less negative impact on the environment compared to the production of primary aluminium. On average, recycling one tonne of aluminium saves over 16 tonnes of greenhouse gas emissions [4]. This is vital in the fight against climate change, as it helps to mitigate the environmental impact of industrial activities. Moreover, production of secondary aluminium conserves natural resources, saves energy, and minimizes waste. As the global community continues to prioritize sustainability and environmental stewardship, the role of aluminium recycling becomes increasingly significant. By promoting and supporting aluminium recycling initiatives, we can work towards a more sustainable and eco-friendly future, while mitigating the environmental impact of metal production.

**Выводы.** The analyses of secondary aluminium production were held. The collecting of raw materials and technologies for production were researched. The benefits of aluminium recycling were defined.

### Список использованных источников:

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3. International Aluminium Institute: IAI study highlights vital role of aluminium cans in a circular economy [Electronic resource]. – 2022. – URL: <https://international-aluminium.org/research-into-the-recycling-of-three-beverage-container-materials-aluminium-glass-and-plastic-pet/> (accessed on 22.01.2024).
4. International Aluminium Institute: Aluminium Recycling Factsheet [Electronic resource]. – 2020. – URL: <https://international-aluminium.org/resource/aluminium-recycling-factsheet/> (accessed on 24.01.2024).