

Critical and Strategic Metals and Minerals in Nordic countries
Raw Materials for the 21st Century

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Commodity	Gallium (Ga)	Data source
Significance for the EU (2023)	<i>Critical and Strategic</i>	
Uses of the commodity	<p><u>Main uses:</u> <i>Semiconductor wafers in integrated circuits, LED lighting</i></p> <p><u>Minor uses:</u> <i>CIGS solar cells, displays, low temperature melting solders and alloys, laser diodes, optoelectronic devices.</i></p> <p><u>Future uses:</u> <i>Radio frequency devices, LED and solar cell uses expected to increase. Demand in integrated circuits expected to be steady.</i></p>	Latunussa et al. (2020), USGS (2022)
Resources and potential in the Nordic countries	<p><i>There are no primary gallium ores in the Nordic countries (or elsewhere in the world).</i></p> <p><u>Greenland:</u> <i>The only known resource in the Nordics, at Skaergaard: 152,000 t Ga. Resource potential: Zinc-dominated sulphide ores across Fennoscandia and Greenland are possible sources, but probably none is tested for gallium except for a few samples per deposit.</i></p>	Lauri et al. (2018), Eilu et al. (2021), Rosa et al. (2023)
Anthropogenic resources and potential in Nordic countries	<i>End-of-life electronics and solar cells, fly ash, zinc refinery and smelter residues.</i>	
Main deposit types in Nordic countries	<i>Layered intrusions, zinc deposits of various kind</i>	
Main global deposit types	<i>Zinc deposits, bauxite, fly ash</i>	Frenzel et al. (2016)
Global production (2022)	<i>Refinery production: 550 t Ga (mine production unknown)</i>	USGS (2023)
Nordic production	<p><i>There is a potential to produce, but apparently no recovery. <u>Iceland:</u> Ga content in imported raw aluminium, or alumina, to refineries is estimated to be 60–100 t/a. There is a potential for extraction of Ga from bauxite being processed in Iceland. <u>Norway:</u> Norsk Hydro AS had, for a short period (late 1960s), a plant aimed at production of 200 kg Ga/year as part of purification of aluminium. In addition, there is the fly ash from coal-fired power plants as another possible source.</i></p>	Pers. comm. from Icelandic Al refineries (2021). Hydro.com pers. com. (2022)
Main producing countries (2022)	<i>China 98.2 %, Russia 0.9 %, Japan 0.5 %, South Korea 0.4 %, Ukraine 0.2 %. Gallium is extracted as a by-product of aluminium production, and some is produced from the residues of zinc production.</i>	USGS (2023)
Technological challenges in production	<i>Extremely high purity is needed for the main uses of Ga, at 99.9999 to 99.99999 % level. This "is only mastered by a few companies" in the world.</i>	Latunussa et al. (2020)

Recycling	<i>Ga is recovered from industrial scrap. No or very little Ga is recovered from post-consumer scrap; this is to the difficulty and cost to recover Ga from items where it is highly dispersed.</i>	Latunussa et al. (2020)
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