Elemental aluminium cannot be produced by the electrolysis of an aqueous aluminium salt because hydronium ions readily oxidize elemental aluminium. Although a molten aluminium salt could be used instead, aluminium oxide has a melting point of 2072 °C[2] so electrolysing it is impractical. In the Hall–Héroult process, alumina, Al_2O_3, is dissolved in molten synthetic cryolite, Na_3AlF_6, to lower its melting point for easier electrolysis.

The **Hall–Héroult process** is the major industrial process for smelting aluminium. It involves dissolving aluminium oxide (alumina) (obtained most often from bauxite, aluminium's chief ore, through the Bayer process) in molten cryolite, and electrolysing the molten salt bath, typically in a purpose-built cell. The Hall–Héroult process applied at industrial scale happens at 940–980°C and produces 99.5–99.8% pure aluminium. Recycled aluminum requires no electrolysis, thus it does not end up in this process.

Anode effect is a situation where too many gas bubbles form to the bottom of the anode and join together forming a layer. This increases the resistance of the cell when smaller areas of the electrolyte touch the anode. These areas of the electrolyte and anode heat up when the density of the electric current of the cell focuses to go through only them. This heats up the gas layer and causes it to expand thus further reducing the surface area where electrolyte and anode are in contact with each other
. Anode effect decreases the energy-efficiency and the aluminium production of the cell. It also induces the formation of tetrafluoromethane (CF_4) in significant quantities, increased formation of CO and to lesser extent also causes the formation of hexafluoroethane (C_2F_6). CF_4 and C_2F_6 are CFCs which, although not detrimental to the ozone layer, are still potent greenhouse gases. Anode effect is mainly a problem in Söderberg technology cells, not in prebake.