Electrolysis of Aluminium

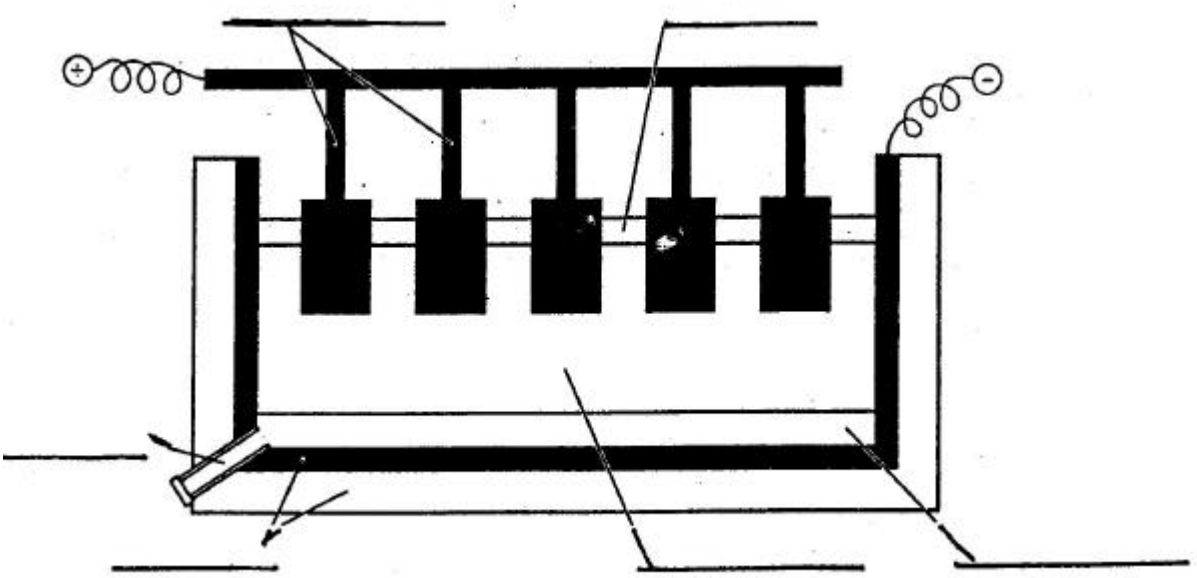
For electrolysis, the anhydrous Al-oxide is dissolved in molten cryolite, undergoing electrolysis in order to form molten aluminium on the carbon cathode. The aluminium is periodically removed.

$$Al^{3+}(l) + 3e^- \rightarrow 3Al(l)$$

Oxygen evolves at the carbon anodes. These slowly react to form carbon dioxide, so the anodes have to be replaced from time to time.

$$2O^{2-}(l) \rightarrow O_2(g) + 4e^- \qquad C(s) + O_2(g) \rightarrow CO_2(g)$$

Aluminium is one of our most plentiful resources, with large amounts present in the Earth's crust. However, the industrial production of the pure metal is an immensely costly procedure. Electrical energy is required not only for the electrolysis itself, but also to maintain the



electrolyte in a molten state at 850° C. On the other hand, aluminium is readily recycled, as old aluminium artefacts such as cans can be crushed and melted for reuse. The cost of producing 'new' aluminium in this way is a fraction of the cost of extracting more aluminium from the Earth, in terms of both cash and energy resources.

Task:
Label the different parts and chemicals of the cell used for the aluminium production

ore: Erz
anhydrous: wasserfrei
molten cryolite: geschmolzener Kryolith
to evolve: entstehen
artefacts: von Menschen geschaffene Gegenstände.