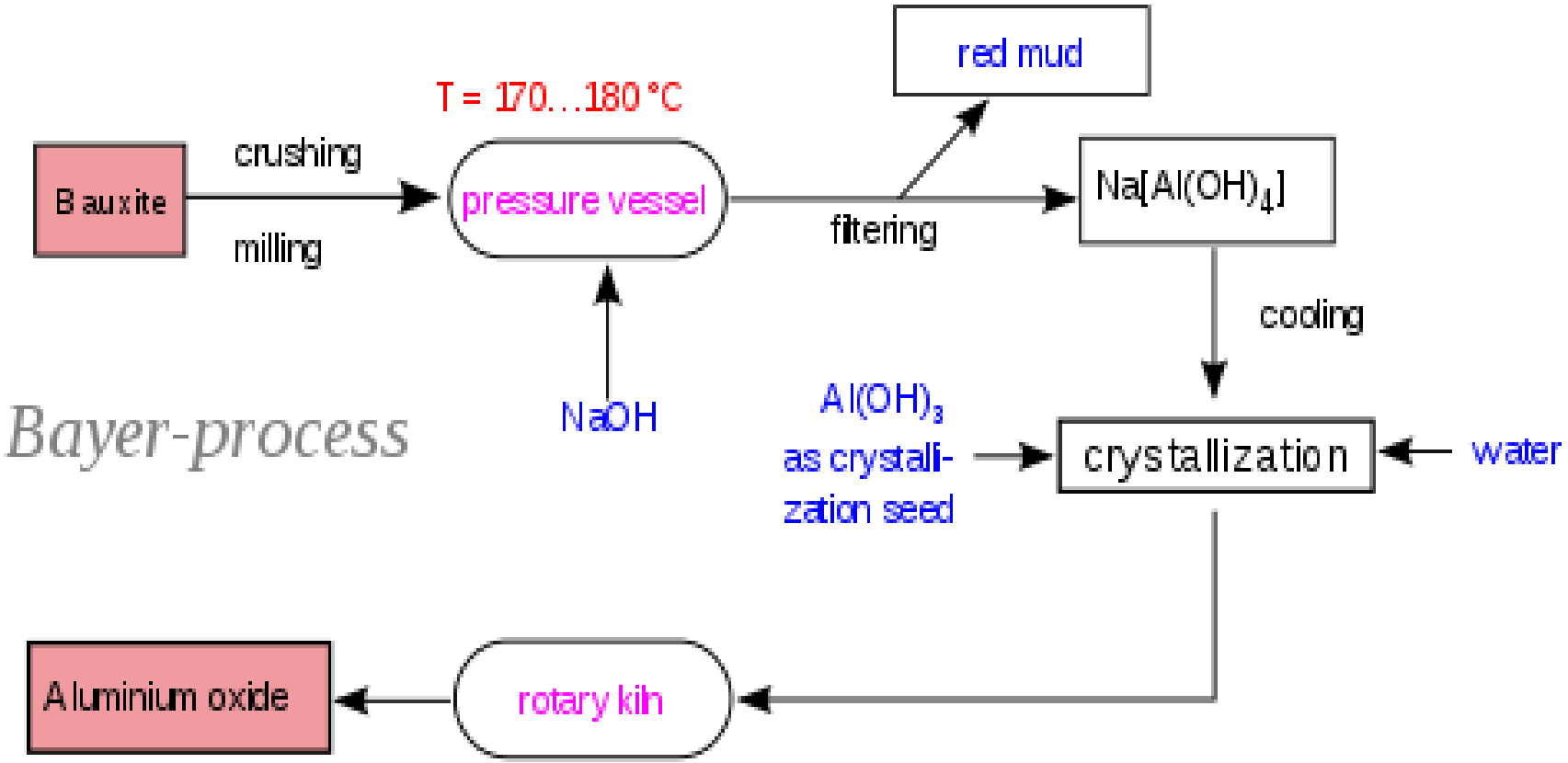
Extraction of Aluminium

- Aluminum is extracted from an ore called Bauxite.
- Ores are metal compounds found in the rocks.
- Bauxite ore mainly contain Aluminium Oxide (Al_2O_3)

Purification of Bauxite Ore

- At first the bauxite ore is crushed to make into smaller pieces.
- Then excess of Sodium Hydroxide is added to the bauxite ore. In excess of NaOH the precipitate of Aluminium dissolve form Aluminium Hydroxide,$Al(OH)_3$. All other impurity like silocone dioxide (SiO_2) are insoluble in NaOH so it is then filter off to remove the impurity.
- The filerate containing $Al(OH)_3$ is then heated to make Alumina which is called Aluminium Oxide.



Bayer-process

Important Notes

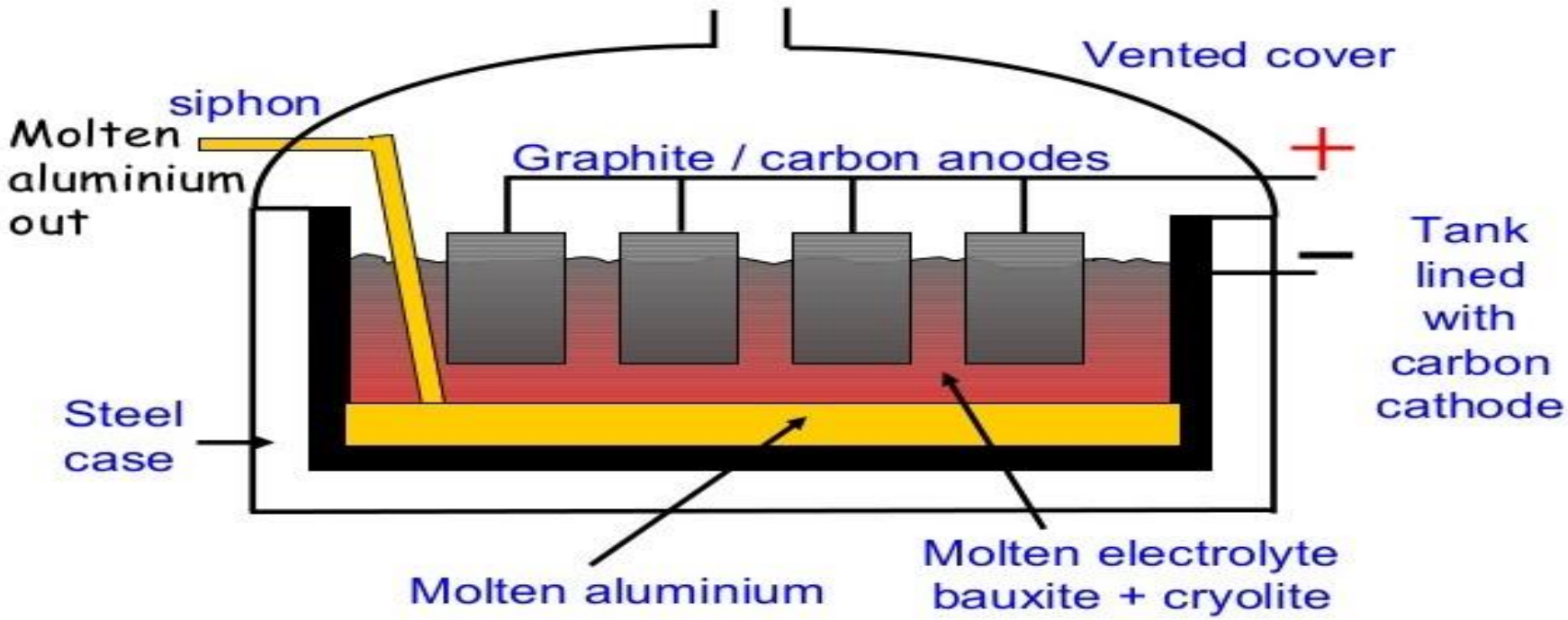
- Aluminium oxide is extracted by electrolysis as Aluminium has a very high melting point.
- The melting point of Aluminium Oxide is very high so with it an substance called cryolite is added. It has the following functions

a. Decrease the melting of Aluminium Oxide.

b. Saves a lot of energy

c. Act as a solvent to dissolve Aluminium Oxide.

Extraction of aluminium: overall



Anode/ Cathode Reaction

Anode reaction:

At the positive electrode:

$2O^{2-} \rightarrow O_2 + 4e^-$ **(oxidation)**

Cathode reaction:

At the negative electrode:

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

Overall reaction:

aluminium oxide → aluminium + oxygen

$2Al_2O_3\ (l) \rightarrow 4Al\ (l) + 3O_2\ (g)$

Some important question?

Why the carbon anode needed to be changed at regular intervals?

- At high temperature, the oxygen produced at the anode react with Carbon forming carbon dioxide, therefore corroding the anode so needed to be changed at regular intervals.

$$C(s) + O_2(g) \longrightarrow CO_2(g)$$

Uses of Aluminium:

1. For making aero plane: very less in weight/ density
2. For making cooking utensil: Very good conductor of electricity.
3. For making over headed cable: Good conductor of electricity and have low weight and density.

Why Aluminium is un reactive?

Aluminium has a layer of oxide/ oxygen on its surface make it un reactive.