**FLUORINE TECHNOLOGY**

**HIGH BULK DENSITY ALUMINIUM FLUORIDE FROM FLUOROSILICIC ACID**

Buss ChemTech is recognized as the world leading technology supplier for fluorine chemicals.

We are able to offer our clients guaranteed operating plants:

Aluminum fluoride is used by aluminum producers to lower the melting point of electrolytes in the smelting process and increase production efficiency.

Our process technology for fluorine chemicals is the result of over fifty years of continuous development linked to direct experience of the design and construction of industrial scale plants.

**THIS RESULTS IN**

- Plant capacities and products specifications tailored to your requirements
- Critical equipment like the AlF₃ Reactor manufactured to strictly controlled specifications
- Prolonged plant life and high productivity

**RANGE OF SERVICES**

- Conceptual design
- Feasibility studies and plant assessments
- Basic and detail engineering
- Process automation
- Materials or total plant supply
- Project management,
- Commissioning and start-up
- After sales service

**AHF PLANT**

Concentrated fluosilicic acid is decomposed in the presence of sulphuric acid according to the following reaction:

\[
H_2SiF_6 + SiF_4(aq) + H_2SO_4 \rightarrow 2SiF_4(g) + 2HF(g) + H_2SO_4(aq)
\]

The reaction produces silicon tetrafluoride gas and hydrogen fluoride. The latter remaining mainly absorbed in the sulphuric acid.

This acid is distilled to produce hydrofluoric acid.

The by-product sulphuric acid is dilute at a concentration of 70% to 75%. This acid is pumped back to the phosphoric acid plant to be fed to the reaction system.

Silicon tetrafluoride gas is cleaned in absorption columns to remove hydrogen fluoride and flows forward to the silicon tetrafluoride concentration system where it is absorbed in fluorosilicic acid feed stock.

SiF₄ gas is absorbed and reacts according to the following overall exothermic reaction:

\[
5SiF_4 + 2H_2O \rightarrow 2H_2SiF_6 + 2SiF_4 + SiO_2(\text{Hydrate})
\]

A by-product of this system is silica. Vent gas from the silicon tetrafluoride concentration system flows to the Central Absorption System before emission to the atmosphere.

**AHF SAFETY STORAGE**

The storage system consists of AHF Storage Tanks within the AHF Storage Containment Tank, stored at a low temperature and at atmospheric pressure.

**ALUMINIUM HYDROXIDE DRYING PLANT**

Aluminium hydroxide is delivered to the plant complex as a wet cake. Drying is carried out in a flash dryer before transport to the respective user.

**ALF₃ PLANT**

Aluminium fluoride is produced by reacting dried aluminium hydroxide with the hydrofluoric acid gas in a fluidized bed reactor.

The reaction can be summarized as follows:

\[
Al(OH)_3 + 3 HF \rightarrow AlF_3 + 3 H_2O
\]

Al(OH)₃ is transported to the Al(OH)₃ Silo from where it is fed into the AlF₃ Reactor.

AHF is evaporated and superheated and fed to the lower bed of the reactor.

Aluminium fluoride is fed from the lower bed of the reactor through a product cooler to storage.

**AHF Plant: Capacity 10,000 MTPY; Fujian Wengfu Lantian, Hubei, PRC**

**AHF Storage, Gulf Fluor, Abu Dhabi**

**ALF₃ Plant**

Aluminium hydroxide is delivered to the plant complex as a wet cake. Drying is carried out in a flash dryer before transport to the respective user.
Tail gases from the process flow to the Central Absorption Section.

Aluminium fluoride product is fed to bulk transport tankers or bag filling plant.

Fine solids transported out of the AlF₃ Reactor with the gas stream are recovered in cyclones and solids from them flow to the product stream.

**KEY FEATURES**

- High quality aluminium fluoride
- Reliability in operation
- Environment and high safety record
- Use of fluorosilicic acid containing high impurity levels

**EXPECTED CONSUMPTION FIGURES**

**Raw Materials**
(per metric ton of aluminium fluoride)
- Fluorosilicic acid 1,080 kg
- Sulphuric Acid 21,000 kg
- Aluminium hydroxide 1,030 kg (calculated as 100% wt AI(OH)₃)

**Utilities for AHF and AlF₃ Plant**
(per metric ton of aluminium fluoride)
- Steam, Low Pressure 0.265 GJ
- Steam, Medium Pressure 0.87 GJ
- Process water 4 m³
- Cooling water 22.7 GJ
- Chilled water 5.7 GJ
- Electricity 315 kWh
- Fuel 0.36 GJ