

FLUORINE TECHNOLOGY

HIGH BULK DENSITY ALUMINIUM FLUORIDE FROM FLUROSILICIC 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 AlF_3 Reactor manufactured to strictly controlled specifications
- Prolonged plant life and high productivity



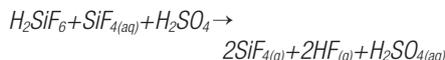
AHF Plant: Capacity 10,000 MTPY; Fujian Wengfu Lantian, Hubei, PRC

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:



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.

SiF_4 gas is absorbed and reacts according to the following overall exothermic reaction:



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.



AHF Storage, Gulf Fluor, Abu Dhabi

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.

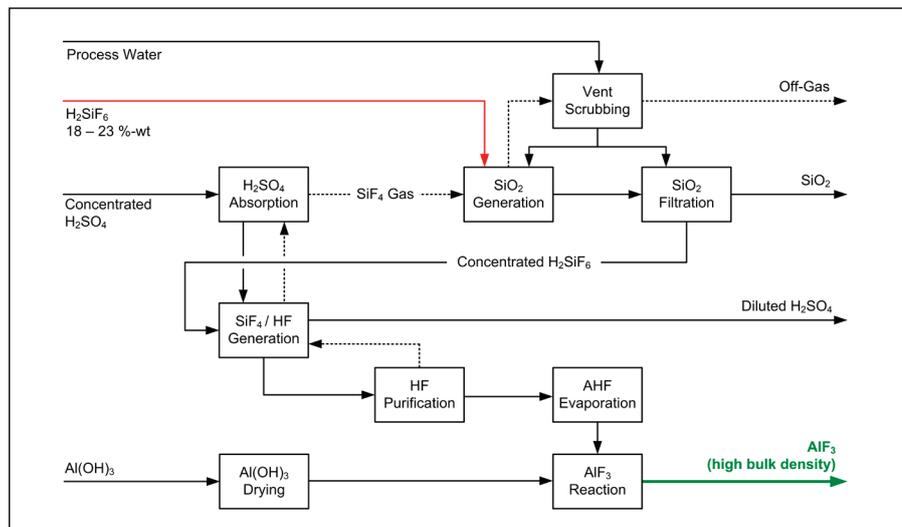
The reaction can be summarized as follows:



$Al(OH)_3$ is transported to the $Al(OH)_3$ Silo from where it is fed into the AlF_3 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.



AlF₃ Plant; Capacity 60,000 MTPY Gulf Fluor, Abu Dhabi

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

- white free-flowing solid
- Bulk Density 1500 kg/m³
- Flowability Index <60 seconds for 1 kg
- L.O.I. (One hour at 550°C) 0.5% wt max.
- Granular size < 45 µm 10% max.
- Granular size > 150 µm 3% max.

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 Al(OH) ₃)	

Utilities for AHF and AlF ₃ Plant	
(per metric ton of aluminium fluoride)	
Steam, Low Pressure	0,265 GJ
Steam, Medium Pressure	0,87 GJ
Process water	4 m ³
Cooling water	22,7 GJ
Chilled water	5,7 GJ
Electricity	315 kWh
Fuel	0,36 GJ

EXPECTED PRODUCT SPECIFICATION		
(per metric ton of aluminium fluoride)		
AlF ₃	91	% wt. min
SO ₄ ⁻	0.004	% wt. max
SiO ₂	0.025	% wt. max
P ₂ O ₅	0.005	% wt. max
Fe ₂ O ₃	0.020	% wt. max
Na ₂ O	0,050	% wt. max