BUSS ChemTech

FLUORINE TECHNOLOGY

HIGH BULK DENSITY ALUMINIUM FLUORIDE (FROM FSA)

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

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.

AlF_3 Plant: Capacity 60,000 mtpy, UAE

We have developed an innovative and ecologically beneficial route for the production of anhydrous hydrofluoric acid from fluorosilicic acid, a waste by-product of fertilizer production.

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

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

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.

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

$$5SiF_4 + 2H_2O \rightarrow 2H_2SiF_6 + 2SiF_4 + SiO_2\,(Hydrate)$$

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.

ALF_3 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 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.

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 AlF_3 Reactor with the gas stream are recovered in cyclones and solids from them flow to the product stream.

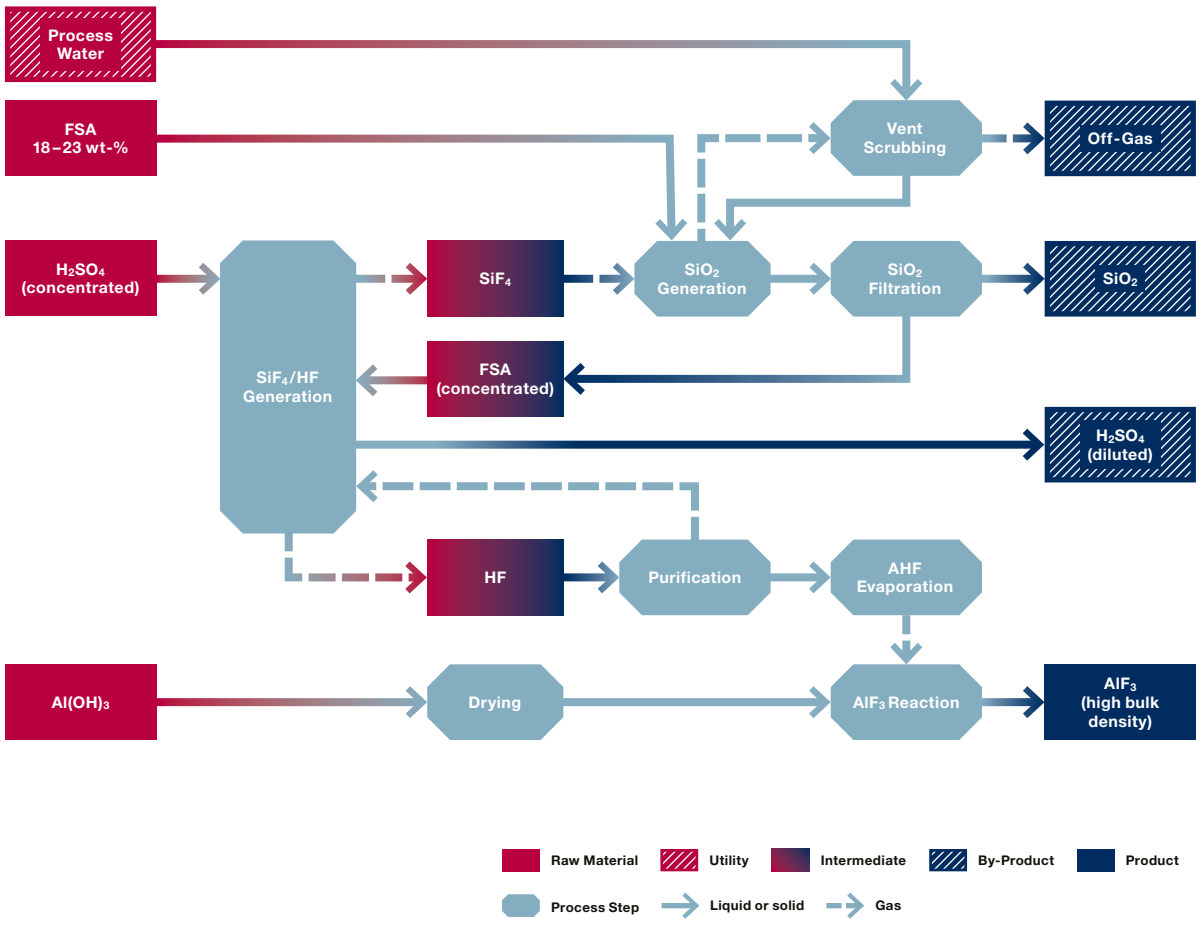
ALUMINIUM HYDROXIDE DRYING PLANT

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.

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 Safety Storage, UAE



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/m^3
- Flowability Index < 60 seconds for 1 kg
- L.O.I. (one hour at 550 °C) max. 0.5 wt-%
- Granular size < 45 µm max. 10 %
- Granular size > 150 µm max. 3 %

Learn more about our technologies. Scan the QR code now!

EXPECTED CONSUMPTION FIGURES

RAW MATERIALS[1]	
Fluorosilicic acid	1,080 kg
Sulphuric acid	21,000 kg
Aluminium hydroxide (calculated as 100 wt-% $Al(OH)_3$	1,030 kg

UTILITIES FOR AHF AND ALF_3 PLANT[1]	
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		
AlF_3	min.	91.000 wt-%
SO_4-	max.	0.004 wt-%
SiO_2	max.	0.025 wt-%
P_2O_5	max.	0.005 wt-%
Fe_2O_3	max.	0.020 wt-%
Na_2O	max.	0.050 wt-%

[1] Values are per metric ton of aluminum fluoride produced.

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