FLUORINE TECHNOLOGY

ANHYDROUS HYDROFLUORIC ACID 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:

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 product specifications tailored to your requirements
- Critical equipment 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

Hydrofluoric acid is an important intermediate for inorganic and organic fluorine compounds, such as aluminium fluoride, cryolite, uranium hexafluoride, fluorocarbons and fluoropolymers.

The key process technology is the production of anhydrous hydrofluoric acid from readily available feed stocks such as fluorosilicic acid. 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.

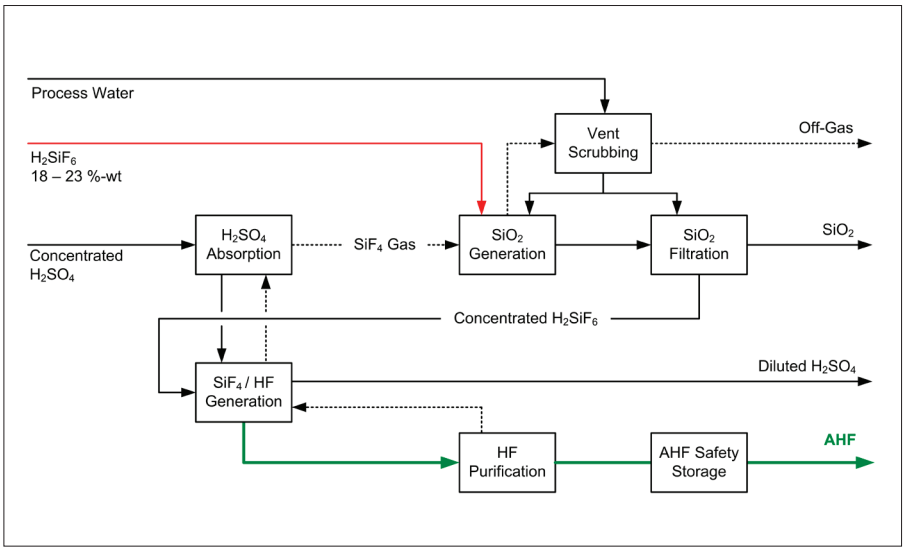
SiF_4 gas is absorbed and reacts according to the following overall exothermic reaction:

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

A by-product of this system is silica.

Vent gas from the silicon tetrafluoride concentration system is cleaned of hydrogen fluoride and flows to the Central Absorption System before emission to the atmosphere.

Capacity 10,000 MTPY; Fujian Wengfu Lantian, Hubei, PRC



KEY FEATURES

- High profitability
- Zero cost raw materials
- Minimum hold-up AHF in the plant
- High quality anhydrous hydrofluoric acid
- Reliability in operation
- Environmental and high safety record

AHF SAFETY STORAGE

HF Storage, Sao Paulo Brazil

AHF is stored at a low temperature in a double containment system with pressure control and safety instrumentation.

The main storage system consists of three AHF Storage Tanks within the AHF Storage Containment Tank. The stored acid can be re-circulated by the AHF Circulating Pump, through the AHF Circulating Cooler, and cooled down to below -5 °C.

The gas inside the outer containment is continuously dried in the AHF Containment Air Dryer. The HF content in the containment is monitored online.

The vent gas flows to the Central Absorption.

EXPECTED CONSUMPTION FIGURES

Raw Materials (per metric ton of hydrofluoric acid)	
Fluorosilicic Acid (FSA calculated as 100 % H_2SiF_6)	1,600 kg
Sulphuric acid (calculated as 100% H_2SO_4)	30,000 kg
Potassium Hydroxide	14 kg

Utilities for AHF Plant (per metric ton of hydrofluoric acid)	
Steam, Low Pressure	0,001 GJ
Steam, Medium Pressure	0,011 GJ
Process water	5 m^3
Cooling water	24 GJ
Chilled water	6,8 GJ
Electricity	315 kWh

EXPECTED PRODUCT SPECIFICATION (per metric ton of hydrofluoric acid)	
HF	99.985 % wt. min
H_2SO_4	0.004 % wt. max
H_2O	0.008 % wt. max
H_2SiF_6	0.001 % wt. max
SO_2	0.001 % wt. max
P_2O_5	0.001 % wt. max

AHF Plant; Capacity 20,000 MTPY; Wengfu Group, PRC

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