

TECHNICAL PACKAGES

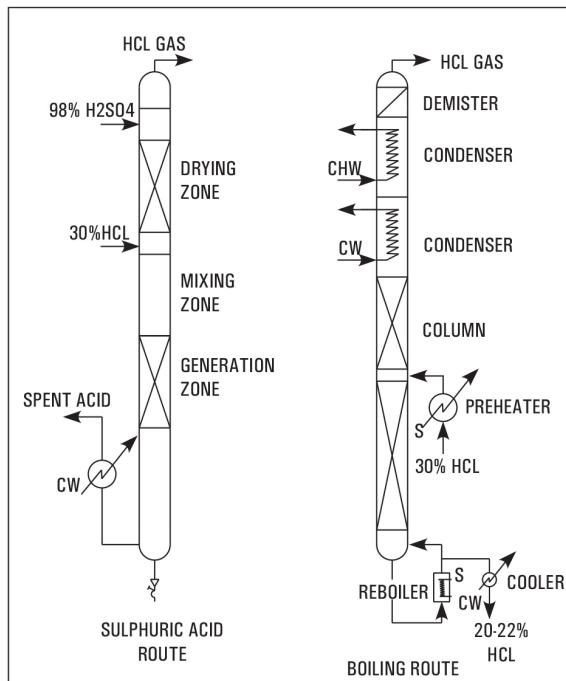
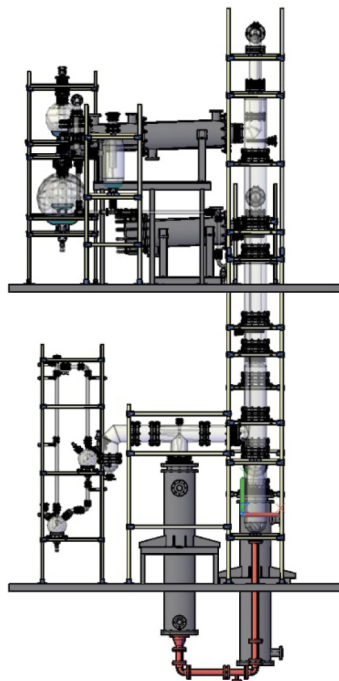
ANHYDROUS HCL GAS GENERATOR

Commercial Hydrochloric Acid is available in the market as 30% aqueous solution. But for certain applications e.g. bulk drug and pharmaceuticals, HCl is required in anhydrous state for critical reactions where moisture cannot be tolerated. Such users generate anhydrous HCl from commercial grade for their captive consumption.

METHOD

Several methods have been adopted by industries. But generation by Sulphuric Acid Route and Boiling Route are commonly practiced.

We offer Calcium Chloride Route also.

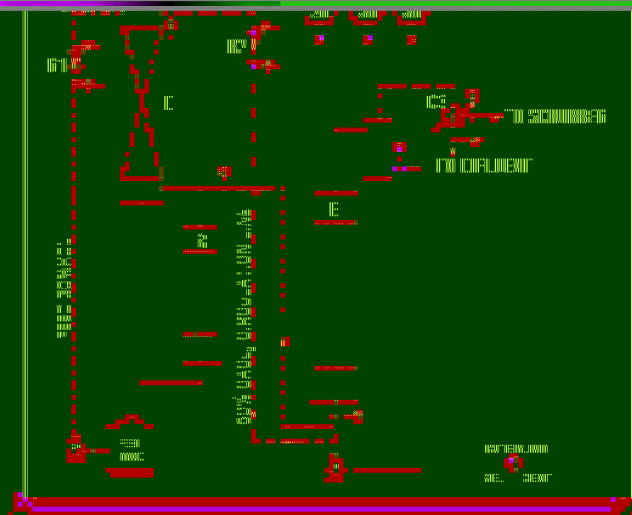


Route	Sulphuric Acid Route	Boiling Route
Working Principle	Hydrochloric acid is highly soluble in water but the solubility diminishes in presence of H ₂ SO ₄ and at 70 to 75% H ₂ SO ₄ concentration its solubility is negligible. Thus by adding (98%) commercial Sulphuric acid to commercial hydrochloric acid (30%) in proper ratio the entire HCl can be liberated in gaseous form leaving 75% H ₂ SO ₄ as spent acid.	Aqueous hydrochloric acid forms a maximum boiling point azeotrope at 110°C containing 20.24% HCl at atmospheric pressure. Thus by distilling commercial hydrochloric acid (30%) pure HCl gas can be generated and spent acid will contain over 20.24% HCl.
Process Outline	Metered quantities of commercial sulphuric acid hydrochloric acids are fed to the unit where they mix in the Mixing Zone. The gas generated forms a froth and enters the Generation Zone where while traveling through a bed gas is released which travels upwards through the Drying Zone. Here the gas comes in intimate contact with downward flow of 98% H ₂ SO ₄ . The dry gas leaving the unit passes through a rotameter. The spent liquor containing 70-75% H ₂ SO ₄ passes through the Cooling Zone before being discharged.	Metered quantity of commercial hydrochloric acid is preheated in a preheater by steam and fed to a fractionating column with steam as heating media in the reboiler. The vapours leaving the column are condensed with coolant as cooling water and chilled brine in stages. The relatively dry gas passes through a mist eliminator and then through a rotameter. The spent acid containing 22% HCl is cooled through a cooler and then discharged.
Salient Features	<ul style="list-style-type: none"> - Operational reliability the unit can be started/ stopped in seconds. - Available in wide range of capacities from 5 to 200 kg/hr of dry HCl. - Except cooling water no other utility e.g. steam chilled water etc. required. - Anhydrous gas. - Capable of operating from 25 to 120%. - Ease of installation. - Negligible pressure drop. - High efficiency 99%. 	<ul style="list-style-type: none"> - Operational reliability. - Available in wide range capacities from 5 kg/hr to 200 kg/hr of dry HCl. - Except commercial hydrochloric acid, no other raw-material is required. - Anhydrous gas. - Capable of operating from 25-100%. - Ease of installation. - Negligible pressure drop.
Indicative Raw-material & Utilities for 20 kg/hr HCl	30% HCl - 70 kg/hr 98% H ₂ SO ₄ - 170 kg/hr Cooling Water - 2 m ³ /hr	30% HCl - 200 Kg/hr Saturated Steam - 50 kg/hr Cooling Water - 3.5 m ³ /hr Chilled Brine - 4 m ³ /hr

Control
valve
a. sensor
b. dilute
operator
c. neutral
d. indicator

Flow

Control
valve
a. sensor
b. dilute
operator
c. neutral
d. indicator



The acid is pumped to a tank where it is mixed with a solution of water. The mixture is then pumped to a column where it is heated by a boiler. The effluent from the bottom of the column is a dilute solution of acid which is concentrated in a tank and re-used. The vapor leaving the condenser is sent to a cooling coil and then to a tank where it is mixed with water. The relatively dry gas passes through a mist eliminator and is then sent to a tank where it is mixed with water.

Basic material utility requirements:

The utility requirements for the 20 kg/hr HCl gas generator are given by

1. 50-60 kg/hr HCl gas
2. Cooling water at 30°C (100°F)
3. Hot oil at 150°C (300°F)
4. Steam at 1.5 bar (21.7 psi)

LEGEND

C1 - CONDENSER

C2 - CONDENSER

C3 - CONDENSER

C4 - CONDENSER

LEGEND

C5 - CONDENSER

C6 - CONDENSER

C7 - CONDENSER

C8 - CONDENSER

LEGEND

C9 - CONDENSER

C10 - CONDENSER

C11 - CONDENSER

C12 - CONDENSER