HCL Gas Generation (Sulphuric Acid Route)

Commercial hydrochloric acid is available in the market as 30% aqueous solution and is widely used in industry in large quantities. But for certain application e.g. in bulk drug/ pharmaceutical industry HCL gas 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. Several methods have been adopted but generation through SULPHURIC ACID ROUTE is the most reliable and handy technique.

Salient Features

- Operational reliability - the unit can be started/stopped in seconds.
- Compact and continuous unit - all operations viz. drying, mixing, gas generation and cooling achieved in same unit.
- Available in wide range capacities - from ± 5kg to 200kg/hr of dry HCL.
- Except cooling water no other utility e.g. Steam, chilled water etc. are required.
- Anhydrous gas.
- Ease of installation.
- Capable of operating from 25-120%.
- Negligible pressure drop.
- High efficiency - 99%

Raw Material Requirement

The indicative requirements for 20 kg/hr HCL gas generator are given below:

- 30% HCL - 70
- 98% H2SO4 - 170
- Cooling water 2 m³/hr
HCL Gas Generation (Azeotropic Boiling Route)

Commercial hydrochloric acid is available in the market as 30% aqueous solution and is widely used in industry in large quantities. But for certain applications e.g. in bulk drug/pharmaceutical industry HCL gas is required in gaseous form. Such users generate anhydrous HCL from commerical grade for their captive consumption. Several methods have been adopted and genertion through BOILING ROUTE is also a reliable technique.

Salient features

- Operational reliability
- Available in wide range capacities - from 10kg to 200kg/hr of dry HCL.
- Except commercial hydrochloric acid, no other raw-material is required.
- The spent acid about 21% HCL usually finds use for captive consumption.
- Capable of operating from 25-100%.
- Easy of installation.
- Negligible pressure drop.

Raw Material & Utility Requirements

The indicative requirements for 20kg/hr HCl gas generator are given below

- 30-32% HCl, (kg/hr) - 250
- Cooling water at 30°C (M3/hr) - 3.5
- Chilled brine at - 10°C (M3/hr) - 4
- Saturated Steam at 2.5 Kgs/cm^2 - g (Kgs) - 50
HCL Gas Absorber (Adiabatic Type)

HCL absorption columns are used for absorption of Hydrochloric gas, which statutorily are not permitted to vent into the atmosphere, and to produce the HCl acid.

The column is constructed with a series of packed sections, a gas introduction point below that, a condenser on the top, and a cooler at the bottom. Make water is sprayed from the top and acid is collected from the bottom.

HCL absorption columns are available in 80DN to 300DN diameter (for the gas rate 10 Kgs/hr to 300 Kgs /hr approx).

<table>
<thead>
<tr>
<th>Packed Column</th>
<th>Condenser HTA</th>
<th>Gas Rate (Approx.)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>80mm x 3m</td>
<td>0.35m 2x2</td>
<td>10Kg/hr</td>
<td>SFHCL 3</td>
</tr>
<tr>
<td>100mm x 4m</td>
<td>0.5m 2x2</td>
<td>20Kg/hr</td>
<td>SFHCL 4</td>
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<tr>
<td>150mm x 4m</td>
<td>1.5m 2x2</td>
<td>60Kg/hr</td>
<td>SFHCL 6</td>
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<tr>
<td>225mm x 4.5m</td>
<td>2.5m 2x2</td>
<td>150Kg/hr</td>
<td>SFHCL 9</td>
</tr>
<tr>
<td>300mm x 4.5m</td>
<td>2.5m 2x2</td>
<td>300Kg/hr</td>
<td>SFHCL 12</td>
</tr>
</tbody>
</table>
HCL Gas Absorber (Falling Film Type)

Hydrogen Chloride gas is produced from the variety of process industries & mainly form chlorination operation. This must be scrubbed before venting to the atmosphere. Hydrogen Chloride has great affinity of water and easily absorbed water. The absorption of Hydrogen Chloride gas in to water cause large amount of heat, which has to be removed by means of suitable device.

The falling film absorber is the simplest form of HCl absorber, which can be operated continuously. Falling Film Absorber is a vertically mounted shell and tube heat exchanger. The standard configuration of the falling film absorber consists of a suitable shell and tube heat exchanger with the necessary drain outlet for the acid. The Hydrogen Chloride Gas enters at the top of the absorber and flows concurrently with water/Dilute HCl. Cooling Water is circulated through shell side of the Falling Film absorber to absorb the heat generated by the dilution of Hydrochloric acid with water. Due to its unique design and construction, the heat of absorption is efficiently removed at the zone of absorption, thereby making the absorber extra efficient. Thus the higher concentration of acid is produced due to low absorbing temperature.

- Capacity Range : 10Kg/hr to 900Kg/hr.
- Available up to 600mm dia.

Salient Features

- High absorption efficiency.
- High acid concentration achievable.
- Low outlet temperature.
- Easy operation and maintenance.
- Safe Operation due to low isothermal temperature.
- Handle a wide range of gas loading with minimum liquid flow rates to maintain full tube wetting.
- All the wetted parts of the falling film absorber are corrosion resistant to all the aggressive gases even at elevated temperatures.
- Variation in Hydrogen Chloride Gas flow rate or Composition causes no operation problem.

Other Area of Application

- Hydrogen chloride gas absorption
- Hydrogen chloride gas / sulphur dioxide gas absorption
- Hydrogen Bromide gas absorption
- Hydrogen chloride gas / sulphur dioxide / Cl2 absorption
- Hydrogen chloride gas / chlorine gas absorption