Manufacturing Vinyl Chloride by Oxychlorination of Ethylene

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Background & Description:

Vinyl chloride is the organic chloride that most important in industrial chemical used to produce the polymer polyvinyl chloride (PVC). The chemical compound 1,2-dichloroethane or ethylene dichloride (EDC), is a chlorinated hydrocarbon, mainly used to produce vinyl chloride monomer (VCM)

EDC is a colourless liquid with a chloroform like odour. The term of oxychlorination describes a process whereby chlorination usually of hydrocarbon is achieved with hydrogen chloride and oxygen in the present of catalyst. In production Vinyl Chloride Monomer (VCM), oxychlorination is one process in production of where in this process the ethylene, dry HCI and air or pure oxygen is react in a heterogeneous catalytic reaction to form EDC and water. The reaction such as:

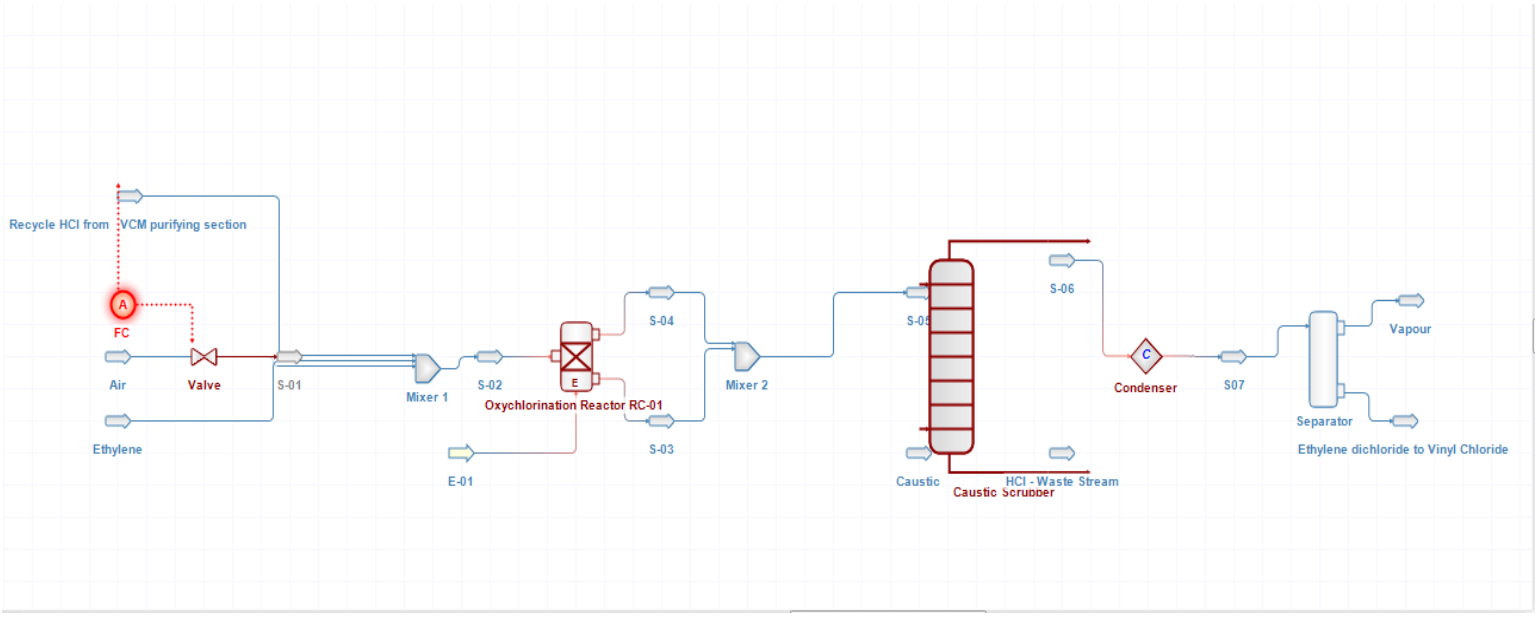
$$C2H4 + 2\ HCl + ½O2 \rightarrow C2H4Cl2 + H2O$$

EDC

The oxychlorination of ethylene to EDC and water is conducted in the gas phase at temperature 280°C and pressure 90 psig in fixed or fluid - bed reactors.

Ethylene, oxygen(air) and recycle HCl will mix first in mixer before entering the reactor section. The product from reactor section will enter caustic scrubbing tower where unreacted HCl is removed. The vapor then passes to a refrigerated condensation system to recover EDC and water. The product steam is cooled and flashed to remove all non condensable mainly nitrogen and unreacted oxygen attop product and EDC at bottom product before the EDC flow to purification section and form vinyl chloride.

Flowsheet:


Recycle HCl from VCM purifying section
A
FC
Air
Valve
Ethylene
S-01
Mixer 1
S-02
E
Oxychlorination Reactor RC-01
E-01
S-04
S-03
Mixer 2
S-05
Caustic
Caustic Scrubber
S-06
HCl - Waste Stream
C
Condenser
S07
Separator
Vapour
Ethylene dichloride to Vinyl Chloride

Results :

Oxychlorination Reactor –

Reactor Temperature	280C
Reactor pressure	90psig
Ethylene	5.5 lbmol/hr
Air (O2)	2.76 lbmol/hr
HCl	0.015 lbmol/hr