Manufacturing of 1,2-Dichloroethane

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Background & Description:

1,2-dichloroethane is commonly known as ethylene dichloride. It is a colourless liquid with chloroform-like odour. It is used majorly in production of vinyl chloride, which is used to make polyvinyl chloride (PVC). Here the production of ethylene dichloride is done by catalytic process in a single step. It has a very high conversion rate of 95%.

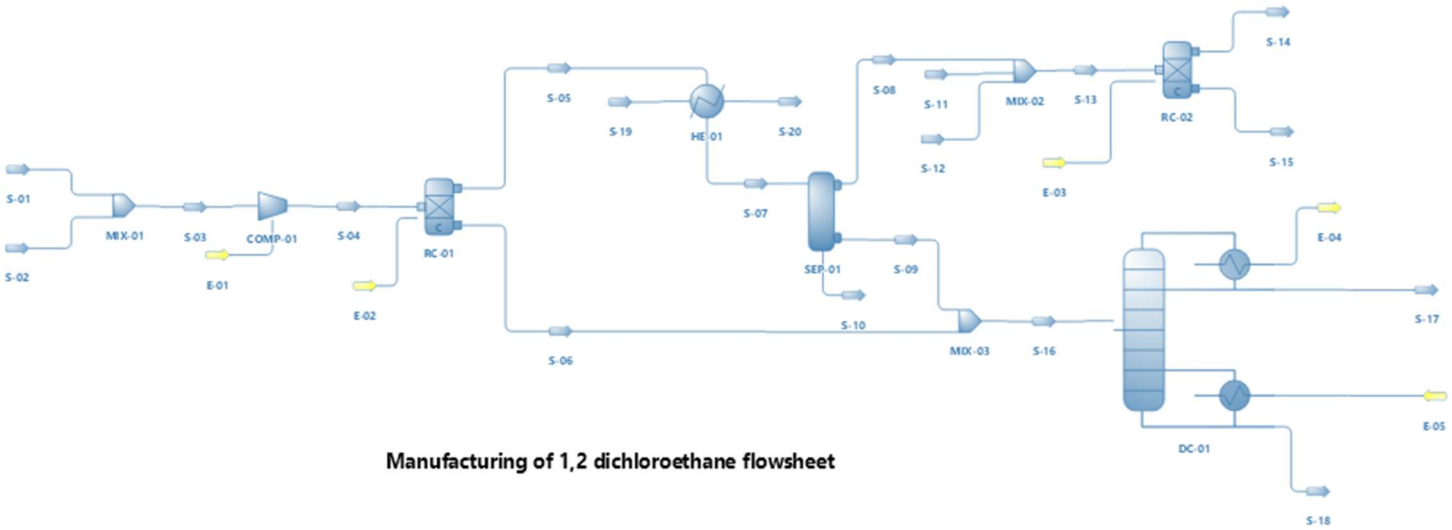
Reaction:

$C_2H_4 + Cl_2 \Rightarrow C_2H_4Cl_2$

Process Description:

The process starts with feeding chlorine (S-01) and ethylene (S-02) to a mixer and then the mixed stream (S-03) is fed to a compressor (COMP-01) where the desired pressure is achieved. They are then fed to a combustion reactor (RC-01) where the product forms along with few by-products. Here chlorine is used as a limiting reactant so that there is no need to recycle. The overhead stream (S-05) is cooled with the help of a heat exchanger (HE-01) and then fed to a vapour liquid separator (SEP-01). The lower stream (S-10) contains maximum product compound. The flue gases (S-08) are then mixed with dilute sodium hydroxide (S-12) and are fed to a reactor where hydrochloric acid is converted and removed as salt and water (S-15). The off gases (S-14) are stored for combustion purposes. The streams (S-16) containing the product is fed to a distillation column (DC-01). Here ethylene dichloride comes out as distillate (S-17) and all the other heavy ends are removed from the bottom stream (S-18).

Flowsheet:



Manufacturing of 1,2 dichloroethane flowsheet

Results:

Master Property Table										
Object	S-01	S-02	S-05	S-06	S-12	S-14	S-15	S-17	S-18	
Temperature	298.15	298.15	323.15	323.15	298.15	309.967	309.967	322.424	431.207	K
Pressure	1	1	2	2	1	1	1	2	2.1	atm
Molar Flow	1015	1030	114.825	965.994	500	65.7365	193.664	953.651	25	mol/h
Specific Enthalpy (Mixture)	-1.09371	-1.64982	25.1435	-323.147	-3030.97	-4.53502	-4149.46	-328.122	-205.557	kJ/kg
Molar Flow (Mixture) / Chlorine	1015	0	1.17E-10	1.56E-10	0	1.12E-10	2.66E-24	1.60E-10	0	mol/h
Molar Flow (Mixture) / Ethylene	0	1000	31.0296	4.79271	0	30.9338	2.10E-17	4.88797	2.34E-15	mol/h
Molar Flow (Mixture) / 1,2-dichloroethane	0	0	16.9937	922.396	0	4.82149	4.06E-24	934.061	0.496855	mol/h

Thus, the manufacturing of 1,2-dichloroethane is completed and the effective yield is 92%.