

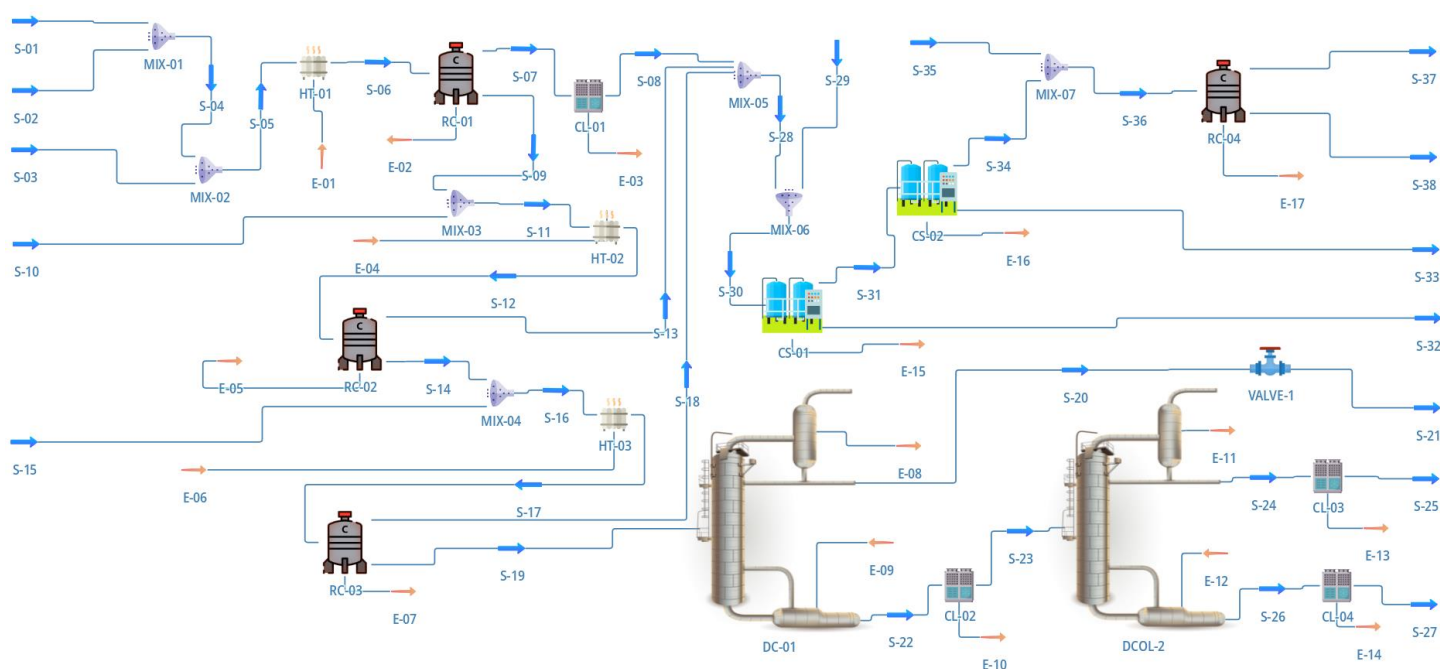
# Production of Trichloroacetaldehyde from Ethanol

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## Background & Description:

Trichloroacetaldehyde also known as 'chloral' is an organic compound with the formula  $\text{Cl}_3\text{CCHO}$ , it is a colourless liquid. It is widely used as a sedative and hypnotic agent in pediatrics, and it is the building block of DDT (dichloro-diphenyl-trichloroethane) and other insecticides. In this flowsheet production of chloral via a continuous process is demonstrated by reacting ethanol with chlorine. ethanol is taken in the reactor at a flow rate of 1000 kg/hr and chlorine at 5000 kg/hr both react to form 2,2,2-Trichloro-1-ethoxy ethanol with an efficiency of 93%, then products are further added to 2nd reactor (RC-02) where water is introduced to produce 2,2,2-Trichloroethane-1,1-diol. In acidulator (RC-03),  $\text{H}_2\text{SO}_4$  will reduce 2,2,2-Trichloroethane-1,1-diol in Trichloroacetaldehyde. This whole process combined produces 1346 kg/hr of Trichloroacetaldehyde, with an efficiency of 97%. Distillation columns are used to purify trichloroacetaldehyde, 1<sup>st</sup> distillation column (DC-01) distillates all low boiling compounds, 2<sup>nd</sup> column (DC-02) separates trichloroacetaldehyde from spent sulphuric acid. Absorption of excess Chlorine takes place in RC-04 and other organic compounds are separated with the help of O-dichlorobenzene. At the end of process, 1109 kg/hr of Trichloroacetaldehyde is recovered, the efficiency of the complete process is 82%.

## Flowsheet:



## Results:

Table 1: Simulation Results

Object	S-07	S-09	S-16	S-19	S-22	S-24	Units
Trichloroacetaldehyde	0	0	0	1345.91	1315.34	1109.55	kg/h
Ethanol	63.078	5.6744	443.292	402.575	4.07E-11	4.48E-11	kg/h
Chlorine	2187.81	9.1982	9.1981	7.884	1.32E-62	1.13E-62	kg/h
Water	29.0231	4.7871	255.654	426.222	421.369	26.5235	kg/h
2,2,2-Trichloroethane-1,1-diol	0	0	1574.75	47.2426	46.7101	4.09E-213	kg/h
2,2,2-Trichloro-1-ethoxy ethanol	13.076	1898.8	56.9641	56.9635	91.3214	5.71E-149	kg/h

## Reference:

Abraham Brothman (1949), MANUFACTURE OF CHLORAL, US2478741A, US patent, <https://patents.google.com/patent/US2478741A>