

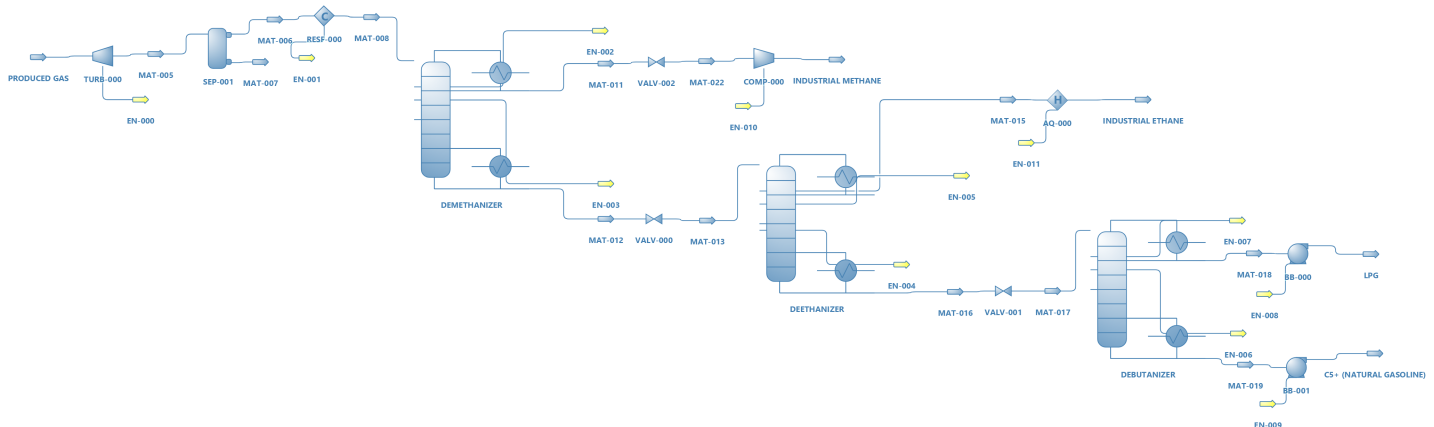
# Natural Gas Processing Unit

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## Background & Description:

One of the important processes in chemical engineering is the processing of natural gas. Moreover, improved production methods due to an increased supply and decreased cost of natural gas, have made the process much more significant. Though the composition of natural gas varies from source to source, it is mostly constituted by methane (70%) with a small amount of ethane, propane, n-butane, isobutane and heavier hydrocarbons.  $C_2$  and heavier hydrocarbons are more valuable than methane and hence it is very important to recover them.  $C_2$  and heavier hydrocarbons are called as 'Natural Gas Liquid'. Recovery is accomplished in a series of three distillation columns.

Recovery of hydrocarbons from the natural gas feed is achieved by using a series of distillation columns. First, industrial methane is separated in a high pressure cryogenic distillation column using expansion. The column is called demethanizer and is designed in a way to keep a low concentration of methane in its bottom product. The column is operated at 10 kgf/cm<sup>2</sup>. Deethanizer is the second column, used in the process to recover industrial ethane. The column operates at 7 kgf/cm<sup>2</sup>. Refrigeration is used in the condenser and the column is designed in such a way that the distillate only has a specified concentration of propane impurity. Debutanizer is the third column, used in the process to recover  $C_3$  and  $C_4$  which are in higher concentration as the distillate known as LPG. The column is operated at 5 kgf/cm<sup>2</sup>. The bottom stream contains  $C_5$  in high concentration along with traces of other hydrocarbons known as Natural Gasoline.



## Results:

Object	PRODUCED GAS	LPG	INDUSTRIAL METHANE	INDUSTRIAL ETHANE	C5+ (NATURAL GASOLINE)	
Temperature	32	18.81856	-140.492	42.04431	88.22132	C
Pressure	40	19.98	8.35868	7	10	kgf/cm <sup>2</sup>
Mass Flow	41363.93	7125.386	23480.96	6088.564	380.4179	kg/h
Molar Flow	1001474	76998.98	773544.4	105000	3000	m <sup>3</sup> /d @ SC
Molar Fraction (Mixture) / Methane	0.698	0	0.89845	0.01627	0	
Molar Fraction (Mixture) / Ethane	0.08725	0.01628	0	0.79656	0	
Molar Fraction (Mixture) / Propane	0.05235	0.42343	0	0.13399	0.00001	
Molar Fraction (Mixture) / n-Butane	0.02	0.1562	0	0.00803	0.00245	
Molar Fraction (Mixture) / i-Butane	0.0401	0.34088	0	0.02478	0.00133	
Molar Fraction (Mixture) / i-Pentane	0.0087	0.04255	0	0.00078	0.09914	
Molar Fraction (Mixture) / n-Pentane	0.0131	0.02066	0	0.00075	0.89708	
Molar Fraction (Mixture) / Nitrogen	0.0785	0	0.10155	0	0	
Molar Fraction (Mixture) / CarbonDiOxide	0.002	0	0	0.01883	0	

Table 1: Streamwise Results for Natural Gas Processing Unit