

SWEETENING OF NATURAL GAS FOLLOWED BY MANUFACTURING OF LPG

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BACKGROUND :

Natural gas is an important element and is widely used. Starting from day to day activities to various process in industries, it is widely utilized. Hence processing of natural gas is very important. Different Natural gas processing plants employs different processes and methods in order to obtain efficient and pure LPG and LNG as final products. Depending upon source, the composition of natural gas can vary. Usually it contains about 75-80% of Methane, 5-10 % of ethane and propane and 0-5% of heavier hydrocarbons. Mainly, every source contains about 1-2 % of CO₂ and H₂S. These gases are also called as ACIDIC GASES. Presence of Acidic gases even in smaller quantities largely effects the calorific values of final product. Hence it is extremely important to reduce the acid gas content from Natural gas stream. This Process is termed as “ Gas Sweetening”. After sweetening, Natural gas is further processed and separated into LPG and LNG as its final products. Heavier hydrocarbons are more valuable than methane, hence it is extremely important to recover them. Recovery is employed by a series of distillation Process.

FLOWSHEET DESCRIPTION :

- A. **Gas sweetening** – Natural gas feed stream maintained at 330K and 60 atm pressure is initially passed through vapor-liquid separator. The feed stream contained approx. 81% of Methane, 7-8% of ethane and propane and 1-2 % of CO₂ and H₂S. Heating the vapor stream from the separator, it is sent to acid gas absorber. The solvent used for absorption is a blend of MEA, DEA and water. During absorption, acidic gases and small traces of hydrocarbon gas are also absorbed in solvent. Absorbed solvent stream is further passed to regenerator column for solvent regeneration. The temperature of the stream is raised to about 400K, before entering the regenerator column. Due to heat, acid gases are separated from the solvent and the solvent is cooled and ready for reuse. The acidic gas is either sent to flaring system or is directly emitted into atmosphere.
- B. **LPG manufacturing** – The Sweet gas obtained from absorber has extremely high temperatures to about 520K. The sweet gas stream is passed through a series of coolers and heat exchangers (Propane Type), which drops the temperature to 247K. The reduction in temperature leads to condensation of heavier Hydrocarbons. The stream is then flashed onto a series of vapor-liquid separators. Two separators in series are used such that the vapor stream from 1st is the inlet stream to 2nd separator. Final vapor product obtained is Super Saturated Vapors containing about 85% of methane. It is then sent to LNG plant for further processing. The bottom streams from both the separators is then fed to glycol dehydration unit for removal of excessive water. The dehydrated gas is cooled to 300K and sent to LEF column. Here, super saturated vapors containing 85% of Methane is obtained as Distillate and is sent to LNG plant for further processing. The Bottoms stream is sent to LPG column. After rigorous distillation, LPG is obtained as Distillate and Lower aromatic Naphtha is obtained as Bottoms.

PENG ROBINSON thermodynamic model is employed in flowsheet.

*As the result master table was not fitting, please view it in DWSIM flowsheet.

