DRYING OF NATURAL GAS USING TEG

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Here, simulation is carried out for Natural gas purification where water is removed from the gases to make it water free Gas and also for removing water herein TEG (Triethylene glycol) used for dehydration process.

- It's necessary to remove water content from the natural gas for the prevention of gradual plugging of the pipeline by ice formation, to avoid liquid slugs and also to avoid risk of condensation of water in pipeline[1].
- There are four types of process used for the removing of water content which is absorption process, adsorption process, gas permeation and refrigeration. Out of four processes in industry two processes widely used which is an absorption and adsorption process.

About Flowsheet:

Herein, Triethylene gylcol used to remove water content from the wet natural gas stream. In process, pure TEG is fed to the top an absorber where it is contacted with wet natural gas stream. As in process glycol removes water by physical absorption and is found in bottom. Natural gas found from the top of the column which is dried [contains 91% methane] and can be used in pipeline for further use. Here in absorber TEG is fed up in top and inlet gas [natural gas stream] is fed up at stage 8.

The bottom stream from the absorber is fed up in distillation column to separate hydrocarbon vapors and triethylene glycol. However, here one thing has to done that reducing pressure of bottom stream before regeneration step. The bottom TEG rich stream is heated in heat exchanger and fed up in regenerator [which consists of a column, an overhead condenser, and a reboiler]. From the regenerator 99.9 % pure triethylene glycol obtained and from the top of column sour gas found which contains 47.6% methane.

Bottom high pure TEG then cooled using cross heat exchanger and fed up in centrifugal pump where its pressure is elevated to that of the absorber nearly to 64 atm pressure. After increasing pressure TEG stream is fed up in cooler to reduce temperature near about 25℃. Now, recycle TEG can be used in initial step of the process [again fed up in absorber].

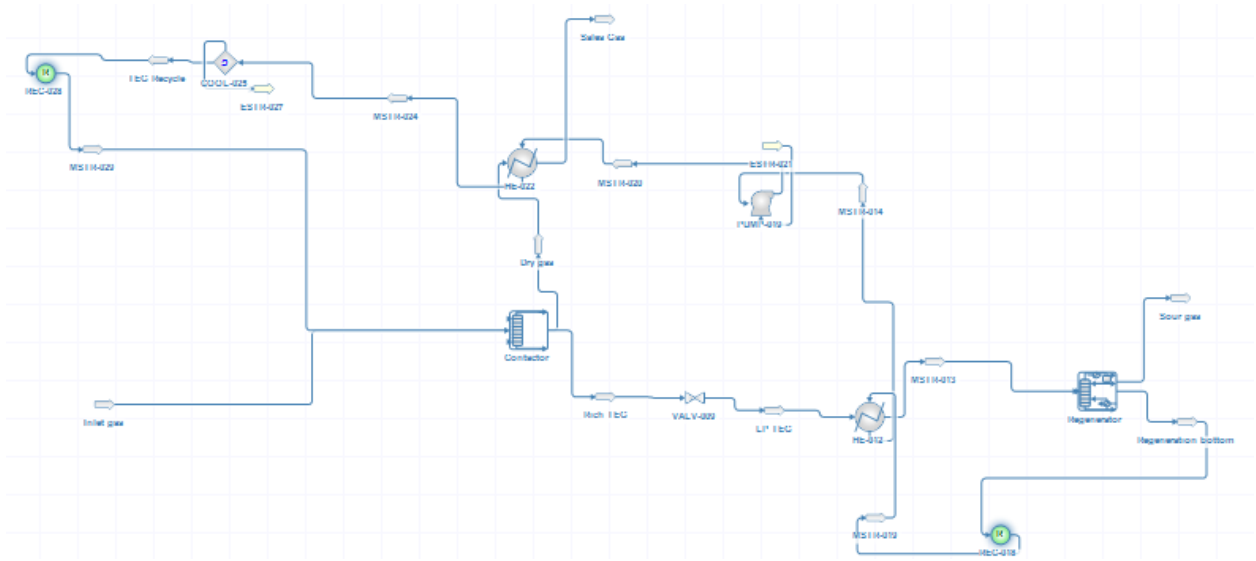

Figure 1: Simulated flowsheet

There are also several issues with TEG dehydration that foreign matters such as dust and any oxides may contaminate glycol solution. There is an also problem regarding overheating in which low and high boiling fraction [knows as decomposition products] may produced. But due to its economic means and easier operation TEG widely used in industry for dehydration process.

Stream Data						
Object	TEG Recycle	Sour gas	Sales Gas	Rich TEG	Inlet gas	
Temperature	25	20.4038	130.464	33.1557	30	C
Pressure	62.7518	1	60.8438	61.1892	61.1892	atm
Molar Flow	40.0278	24.8093	475.191	64.837	500	kmol/h
Molar Fraction (Mixture) / Nitrogen	2.31771E-13	0.00021426	0.00104102	8.19846E-05	0.001	
Molar Fraction (Mixture) / Hydrogen sulfide	5.36944E-08	0.100824	0.0110453	0.0385795	0.0155	
Molar Fraction (Mixture) / Carbon dioxide	2.27177E-09	0.0661423	0.0264295	0.0253087	0.0284	
Molar Fraction (Mixture) / Methane	2.9309E-09	0.476906	0.91988	0.182483	0.8979	
Molar Fraction (Mixture) / Ethane	2.24764E-08	0.0955758	0.0276286	0.0365711	0.031	
Molar Fraction (Mixture) / Propane	4.01523E-07	0.0965775	0.0105305	0.0369547	0.0148	
Molar Fraction (Mixture) / Isobutane	2.27464E-06	0.0678309	0.00266665	0.0259562	0.0059	
Molar Fraction (Mixture) / N-butane	2.93963E-06	0.045862	0.000762216	0.0175505	0.003	
Molar Fraction (Mixture) / Isopentane	9.2063E-06	0.0198685	1.48929E-05	0.00760818	0.001	
Molar Fraction (Mixture) / N-pentane	7.64175E-06	0.0100472	1.55058E-06	0.00384918	0.0005	
Molar Fraction (Mixture) / Water	0.000716931	0.0201509	1.51935E-07	0.00815313	0.001	
Molar Fraction (Mixture) / Triethylene glycol	0.999261	1.51525E-09	1.00142E-09	0.616903	0	

Figure 2: Stream Data

References:

[1] A Report on gas dehydration process by using triethylene glycol and silica gel by khairul rafik b Abdullah[faculty of chemical & natural resources engineering university malaysia Pahang] april-2009