

Natural Gas Processing Plant

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Background & Description:

The end natural gas used by the consumers mainly consist of methane. The raw natural gas or associated gas contains hydrocarbon mixtures like methane, ethane, propane, butane, and pentane. In addition to this, it will also contain water content and acid gases like CO_2 and H_2S . Here the composition of associated gas is given, which contains about 69% mole fraction of methane. It will then undergo removal of excess water in order to reduce load to gas dehydration unit and also to avoid corrosion. It is then followed by acid gases removal using scrubbers. The presence of acid gases like H_2S and CO_2 could lead to corrosion. The third step is to dehydrate by a dehydrator, to avoid corrosion and gas hydrate formation. Formation of mercury amalgam in the downstream of LNG is a serious issue so mercury removal should be done. To improve the gas quality and for lowering the heating value we then remove nitrogen. The final step is to separate the NGL. The final NG will contain about 82% methane. The process flowsheet is given below.

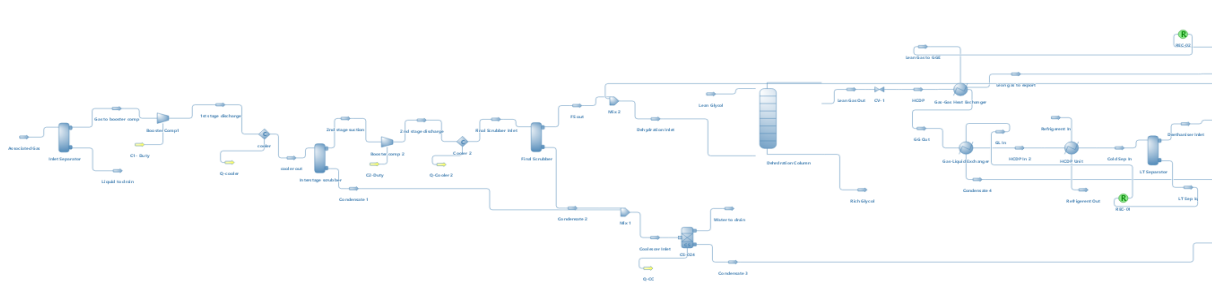


Fig 1- Flowchart part 1

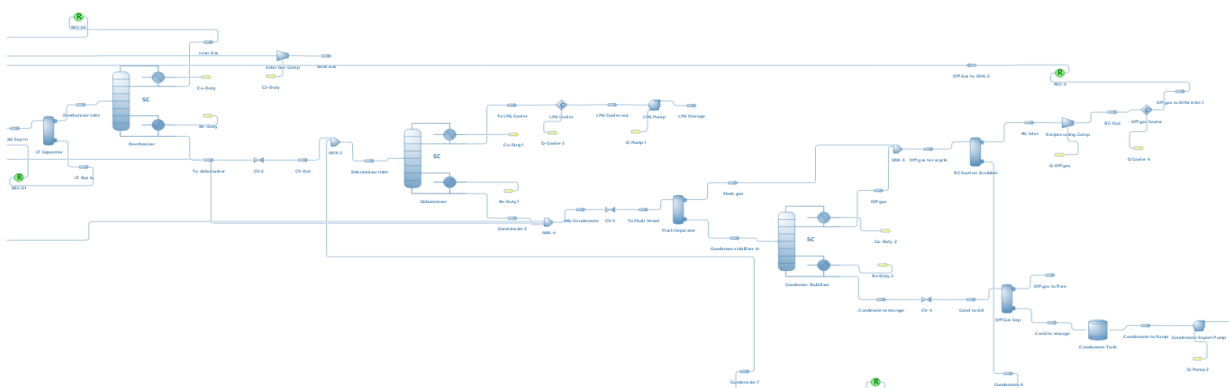


Fig 2- Flowchart part 2

Results:

RESULT OF MAIN STREAMS					
Object	Sales Gas	LPG Storage	Condensate to export	Associated Gas	
Temperature	34.3112	30.6787	25.75	35	C
Pressure	40	15	5	5	bar
Mass Flow	74640.4	11628	1595.8	116487	kg/h
Molar Flow	4056.28	235.625	22.1521	5000	kmol/h
Volumetric Flow	2405.3	22.8829	2.5807	25159.1	m3/h
Molar Fraction (Vapor Phase) / Methane	0.820335	5.02714E-12	1.98324E-23	0.69	
Molar Fraction (Overall Liquid Phase) / Methane	NaN	3.66597E-13	1.8059E-25	NaN	
Molar Fraction (Vapor Phase) / Propane	0.0001	0.782831	2.61378E-08	0.05	
Molar Fraction (Overall Liquid Phase) / Propane	NaN	0.624654	3.64436E-09	NaN	

Table 1- Main stream wise results

Associated Gas (Material Stream)

General Info

Object: Associated Gas

Status: Calculated (01-01-0001 00:00:00)

Linked to

Connections

Upstream:

Downstream: Inlet Separator

Input Data Results Annotations Floating Tables

Stream Conditions Compound Amounts

Basis: Mole Fractions

Solvent:

Compound	Amount
Methane	0.69
Ethane	0.08
Propane	0.05
N-butane	0.02
Isobutane	0.04
Isopentane	0.013
N-pentane	0.008
Nitrogen	0.078
Water	0.019
Carbon dioxide	0.002
Triethylene glycol	0

Total: 1

Normalize Equalize Clear Accept Changes

Fig 2- Stream composition (associated gas)

Sales Gas (Material Stream)

General Info

Object: Sales Gas

Status: Calculated (01-01-0001 00:00:00)

Linked to

Connections

Upstream: Sales Gas Comp

Downstream:

Input Data Results Annotations Floating Tables

Stream Conditions Compound Amounts

Basis: Mole Fractions

Solvent:

Compound	Amount
Methane	0.82033466
Ethane	0.082546231
Propane	0.0001
N-butane	4.7458668E-12
Isobutane	6.1258944E-10
Isopentane	9.2366082E-18
N-pentane	3.7888203E-19
Nitrogen	0.094985505

Total: 1.00009

Normalize Equalize Clear Accept Changes

Fig 3- Stream composition (Sales gas/ NG)

Condensate to export (Material Stream)

General Info

Object: Condensate to export

Status: Calculated (01-01-0001 00:00:00)

Linked to

Connections

Upstream: Condensate Export Pump

Downstream:

Input Data Results Annotations Floating Tables

Stream Conditions Compound Amounts

Basis: Mole Fractions

Solvent:

Compound	Amount
Methane	1.8059041E-25
Ethane	4.9293697E-16
Propane	3.6443556E-09
N-butane	0.009073207
Isobutane	0.00052836558
Isopentane	0.62938691
N-pentane	0.35996143
Nitrogen	3.141446E-33

Total: 1

Normalize Equalize Clear Accept Changes

Fig 4- Stream composition (condensate to export)

LPG Storage (Material Stream)

General Info

Object: LPG Storage

Status: Calculated (01-01-0001 00:00:00)

Linked to

Connections

Upstream: LPG Pump

Downstream:

Input Data Results Annotations Floating Tables

Stream Conditions Compound Amounts

Basis: Mole Fractions

Solvent:

Compound	Amount
Methane	3.6659651E-13
Ethane	0.000101626
Propane	0.62465385
N-butane	0.088270605
Isobutane	0.28663462
Isopentane	0.0001
N-pentane	3.3006351E-06
Nitrogen	5.7598742E-20
Water	0.00023614326

Total: 1

Normalize Equalize Clear Accept Changes

Fig 5- Stream composition (LPG storage)