Simulation PRICO LNG Process Using Open and Proprietary Sources

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Background & Description:

The simulation using computer software in simulating LNG processes becomes quite popular among researchers today. There are some type or brand of chemical simulator that can be purchased from the market such as ASPEN Plus, ASPEN HYSYS, ProSim Plus, and UniSim software . But, there are also a few software that can be used as an open-source type of software such as DWSIM and COCO simulator . The PRICO process, which is one of them, is also known as a single mixed refrigerant (SMR) process. This process has been developed by the Black&Veatch Company, and the industrial applications of PRICO started in the year 1955, when it was applied to one of the first LNG plants. Three U.S./international patents cover the PRICO process. At present at least 21 LNG plants use this process while 16 more plants are in the design and/or construction phase. The PRICO process is popular for LNG peak-shaving units. In the year 2010, 25% of the LNG plants in the U.S. used this process. In the year 2012, design and construction for the world's first offshore LNG project started. The PRICO process was simulated using DWSIM software in this paper. The results obtained from simulation then was compared with the results from Morose et al. The data and assumptions used in this paper follow the same in their work [19]. For the simulation, the following assumption was used: • The ambient temperature is 25 C, and the ambient pressure is 1.013 bar. • Inlet characteristics of natural gas: T8 = 38 C.The pressure drop within the heat exchanger is 3 bar for all three streams. • The minimum temperature difference within the cooler and the condenser is 3 K. • The isentropic efficiency for both compressors is assumed to be equal to 80%. • The compositions of refrigerant and natural gas are given in Table 1. Note that n-butane is lumped with butane

Flowsheet:
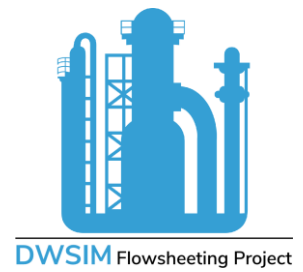
Results:

Object: S-03
Type: Material Stream

Property	Value	
Temperature	298.15	K
Pressure	101325	Pa
Mass Flow	1	kg/s
Molar Flow	0	mol/s
Volumetric Flow	0	m3/s
Mixture Molar Fraction		
Propane	0.2	
Nitrogen	0.2	
Ethane	0.2	
Methane	0.2	
N-butane	0.2	

Object: S-02
Type: Material Stream

Property	Value	
Temperature	298.15	K
Pressure	101325	Pa
Mass Flow	1	kg/s
Molar Flow	0	mol/s
Volumetric Flow	0	m3/s
Mixture Molar Fraction		
Propane	0.2	
Nitrogen	0.2	
Ethane	0.2	
Methane	0.2	
N-butane	0.2	

Object: RECYCLE
Type: Material Stream

Property	Value	
Temperature	298.15	K
Pressure	1.01325E+15	Pa
Mass Flow	1	kg/s
Molar Flow	0	mol/s
Volumetric Flow	0	m3/s
Mixture Molar Fraction		
Propane	0.2	
Nitrogen	0.2	
Ethane	0.2	
Methane	0.2	
N-butane	0.2	