

tratamento-de-dados1

May 31, 2022

```
[ ]: from CoolProp.CoolProp import PropsSI
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from CoolProp.Plots import PropertyPlot
```

```
[ ]: #definindo funções de conversão
def celcius_to_kelvin(T):
    return T + 273.15

def psi_to_pascal(P,manometro=True):
    if manometro:
        return P * 6894 + 101325
    return P * 6894
```

1 Cálculos iniciais

1.1 Propriedades do ciclo de refrigeração

```
[ ]: # definindo variáveis de entrada

# refrigeradorv

P1_r = psi_to_pascal(25)
T1_r = celcius_to_kelvin(2)
H1_r = PropsSI('H','P',(P1_r),'T',(T1_r),'R134a')

P2_r = psi_to_pascal(140)
T2_r = celcius_to_kelvin(41)
H2_r = PropsSI('H','P',(P2_r),'T',(T2_r),'R134a')

P3_r = psi_to_pascal(115)
T3_r = celcius_to_kelvin(30)
H3_r = PropsSI('H','P',(P3_r),'T',(T3_r),'R134a')
```

```

P4_r = psi_to_pascal(0)
T4_r = celcius_to_kelvin(12)
H4_r = PropsSI('H', 'P', (P4_r), 'T', (T4_r), 'R134a')

#calculando variações

delta_T_eva_r = T1_r - T4_r
delta_T_cond_r = T3_r - T2_r
delta_P_eva_r = P1_r - P4_r
delta_P_cond_r = P3_r - P2_r

#calculo de COP

COP_r = (H1_r - H4_r)/(H2_r - H1_r)

ref_prop_df = pd.DataFrame(
    np.array((
        [T1_r,P1_r,H1_r],
        [T2_r,P2_r,H2_r],
        [T3_r,P3_r,H3_r],
        [T4_r,P4_r,H4_r],
    )),
    columns=[
        'Temperatura',
        'Pressão',
        'Entalpia'
    ]
)

ref_calc_df = pd.DataFrame(
    np.array((
        [
            delta_T_eva_r,
            delta_T_cond_r,
            delta_P_eva_r,
            delta_P_cond_r,
            COP_r
        ]
    )).reshape(1,5),
    columns=[
        "delta_T_eva",
        "delta_T_cond",
        "delta_P_eva",
        "delta_P_cond",
        "COP"
    ]
)

```

```
)
```

Dados do experimento como refrigerador

```
[ ]: ref_prop_df
```

```
[ ]:      Temperatura    Pressão      Entalpia
0      275.15    273675.0  400931.735340
1      314.15   1066485.0  257900.317920
2      303.15    894135.0  241718.679880
3      285.15    101325.0  413584.400236
```

```
[ ]: ref_calc_df
```

```
[ ]:      delta_T_eva  delta_T_cond  delta_P_eva  delta_P_cond      COP
0      -10.0         -11.0      172350.0    -172350.0  0.088461
```

1.2 Propriedades do ciclo de bomba de calor

```
[ ]: # bomba de calor

P1_H = psi_to_pascal(130)
T1_H = celcius_to_kelvin(41)
H1_H = PropsSI('H', 'P', (P1_H), 'T', (T1_H), 'R134a')

P2_H = psi_to_pascal(30)
T2_H = celcius_to_kelvin(2)
H2_H = PropsSI('H', 'P', (P2_H), 'T', (T2_H), 'R134a')

P3_H = psi_to_pascal(0)
T3_H = celcius_to_kelvin(2)
H3_H = PropsSI('H', 'P', (P3_H), 'T', (T3_H), 'R134a')

P4_H = psi_to_pascal(110)
T4_H = celcius_to_kelvin(35)
H4_H = PropsSI('H', 'P', (P4_H), 'T', (T4_H), 'R134a')

#calculando variações

delta_T_eva_H = T2_H - T3_H
delta_T_cond_H = T4_H - T1_H
delta_P_eva_H = P2_H - P3_H
delta_P_cond_H = P4_H - P1_H

#calculando de COP
```

```
COP_H = (H4_H - H1_H)/(H1_H - H2_H)
```

```
hb_prop_df = pd.DataFrame(  
    np.array((  
        [T1_H,P1_H,H1_H],  
        [T2_H,P2_H,H2_H],  
        [T3_H,P3_H,H3_H],  
        [T4_H,P4_H,H4_H],  
    )),  
    columns=[  
        'Temperatura',  
        'Pressão',  
        'Entalpia'  
    ]  
)
```

```
hb_calc_df = pd.DataFrame(  
    np.array((  
        [  
            delta_T_eva_H,  
            delta_T_cond_H,  
            delta_P_eva_H,  
            delta_P_cond_H,  
            COP_H  
        ]  
    )).reshape(1,5),  
    columns=[  
        "delta_T_eva",  
        "delta_T_cond",  
        "delta_P_eva",  
        "delta_P_cond",  
        "COP"  
    ]  
)
```

Dados do experimento como bomba de calor

```
[ ]: hb_prop_df
```

```
[ ]:
```

	Temperatura	Pressão	Entalpia
0	314.15	997545.0	421049.335476
1	275.15	308145.0	399954.364283
2	275.15	101325.0	405332.441723
3	308.15	859665.0	417891.448708

```
[ ]: hb_calc_df
```

```
[ ]:      delta_T_eva  delta_T_cond  delta_P_eva  delta_P_cond      COP
      0           0.0          -6.0      206820.0    -137880.0 -0.149699
```

2 Representação em diagramas P×H

2.1 Ciclo de refrigeração

```
[ ]: ph_plot = PropertyPlot('R134a', 'Ph')
      ph_plot.calc_isolines()
      ax = ph_plot.axis
      ax.plot(ref_prop_df.Entalpia/10**3,
              ref_prop_df.Pressão/10**3,
              'o',
              ref_prop_df.Entalpia/10**3,
              ref_prop_df.Pressão/10**3,
              '-',
              color='b',
              )
      ph_plot.show()
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8771670.263783, 2426.329225 with index (248,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [247.563 J/mol/K] is above the maximum value
of 247.390746622 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
9133000.049092, 2426.329225 with index (249,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [247.563 J/mol/K] is above the maximum value
of 246.954593629 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1426198.569157, 2593.934527 with index (203,): unable to solve 1phase PY flash
with Tmin=326.333, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 264.649485294 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1484947.702139, 2593.934527 with index (204,): unable to solve 1phase PY flash
with Tmin=327.979, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
```

not find a solution because Smolar [264.664 J/mol/K] is above the maximum value of 264.296093179 J/mol/K

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1546116.877253, 2593.934527 with index (205,): unable to solve 1phase PY flash  
with Tmin=329.641, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 263.941973378 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1609805.782846, 2593.934527 with index (206,): unable to solve 1phase PY flash  
with Tmin=331.321, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 263.587096372 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1676118.213707, 2593.934527 with index (207,): unable to solve 1phase PY flash  
with Tmin=333.017, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 263.231431484 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1745162.240226, 2593.934527 with index (208,): unable to solve 1phase PY flash  
with Tmin=334.729, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 262.874946834 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1817050.384517, 2593.934527 with index (209,): unable to solve 1phase PY flash  
with Tmin=336.459, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 262.517609297 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1891899.803794, 2593.934527 with index (210,): unable to solve 1phase PY flash  
with Tmin=338.206, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 262.159384466 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1969832.481308, 2593.934527 with index (211,): unable to solve 1phase PY flash
```

```

with Tmin=339.97, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 261.800236601 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2050975.425145, 2593.934527 with index (212,): unable to solve 1phase PY flash
with Tmin=341.752, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 261.440128595 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2135460.875208, 2593.934527 with index (213,): unable to solve 1phase PY flash
with Tmin=343.55, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 261.07902192 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2223426.518737, 2593.934527 with index (214,): unable to solve 1phase PY flash
with Tmin=345.366, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 260.71687659 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2315015.714694, 2593.934527 with index (215,): unable to solve 1phase PY flash
with Tmin=347.198, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 260.353651117 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2410377.727404, 2593.934527 with index (216,): unable to solve 1phase PY flash
with Tmin=349.048, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 259.989302463 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2509667.969805, 2593.934527 with index (217,): unable to solve 1phase PY flash
with Tmin=350.915, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 259.623786002 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs

```

2613048.256735, 2593.934527 with index (218,): unable to solve 1phase PY flash with Tmin=352.798, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could not find a solution because Smolar [264.664 J/mol/K] is above the maximum value of 259.257055475 J/mol/K

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2720687.068639, 2593.934527 with index (219,): unable to solve 1phase PY flash
with Tmin=354.698, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 258.88906295 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2832759.826146, 2593.934527 with index (220,): unable to solve 1phase PY flash
with Tmin=356.615, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 258.519758786 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2949449.175955, 2593.934527 with index (221,): unable to solve 1phase PY flash
with Tmin=358.546, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 258.149091592 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3070945.288494, 2593.934527 with index (222,): unable to solve 1phase PY flash
with Tmin=360.493, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 257.777008199 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3197446.167850, 2593.934527 with index (223,): unable to solve 1phase PY flash
with Tmin=362.454, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 257.403453628 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3329157.974453, 2593.934527 with index (224,): unable to solve 1phase PY flash
with Tmin=364.429, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 257.028371063 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
```



```

packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3466295.361061, 2593.934527 with index (225,): unable to solve 1phase PY flash
with Tmin=366.415, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 256.651701836 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3609081.822587, 2593.934527 with index (226,): unable to solve 1phase PY flash
with Tmin=368.41, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 256.273385412 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3757750.060323, 2593.934527 with index (227,): unable to solve 1phase PY flash
with Tmin=370.411, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 255.893359386 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3912542.361185, 2593.934527 with index (228,): unable to solve 1phase PY flash
with Tmin=372.411, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 255.511559483 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4073710.992571, 2593.934527 with index (229,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 255.127919578 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4241518.613479, 2593.934527 with index (230,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 254.742371721 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4416238.702573, 2593.934527 with index (231,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 254.354846181 J/mol/K
    warnings.warn(

```

```

/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4598156.003873, 2593.934527 with index (232,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 253.965271505 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4787566.990804, 2593.934527 with index (233,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 253.573574593 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4984780.349368, 2593.934527 with index (234,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 253.179680803 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
5190117.481213, 2593.934527 with index (235,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 252.783514074 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
5403913.027422, 2593.934527 with index (236,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 252.384997078 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
5626515.413890, 2593.934527 with index (237,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 251.98405141 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
5858287.419153, 2593.934527 with index (238,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 251.580597805 J/mol/K

```

```

warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6099606.765615, 2593.934527 with index (239,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 251.174556402 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6350866.735132, 2593.934527 with index (240,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 250.765847049 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6612476.809944, 2593.934527 with index (241,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 250.35438966 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6884863.340017, 2593.934527 with index (242,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 249.94010462 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7168470.237873, 2593.934527 with index (243,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 249.522913256 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7463759.702041, 2593.934527 with index (244,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 249.102738367 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7771212.970305, 2593.934527 with index (245,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value

```

of 248.679504822 J/mol/K

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
8091331.103991, 2593.934527 with index (246,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 248.253140233 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
8424635.804550, 2593.934527 with index (247,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 247.823575697 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
8771670.263783, 2593.934527 with index (248,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 247.390746622 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
9133000.049092, 2593.934527 with index (249,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 246.954593629 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
197311.794353, 2761.539828 with index (154,): unable to solve 1phase PY flash  
with Tmin=262.741, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 281.467583575 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
205439.622480, 2761.539828 with index (155,): unable to solve 1phase PY flash  
with Tmin=263.764, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 281.129488256 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
213902.258723, 2761.539828 with index (156,): unable to solve 1phase PY flash  
with Tmin=264.797, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
```

not find a solution because Smolar [281.765 J/mol/K] is above the maximum value of 280.791291424 J/mol/K

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
222713.494770, 2761.539828 with index (157,): unable to solve 1phase PY flash  
with Tmin=265.839, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 280.452988902 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
231887.690428, 2761.539828 with index (158,): unable to solve 1phase PY flash  
with Tmin=266.891, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 280.114576339 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
241439.797026, 2761.539828 with index (159,): unable to solve 1phase PY flash  
with Tmin=267.952, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 279.776049206 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
251385.381778, 2761.539828 with index (160,): unable to solve 1phase PY flash  
with Tmin=269.023, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 279.437402788 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
261740.653156, 2761.539828 with index (161,): unable to solve 1phase PY flash  
with Tmin=270.104, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 279.098632175 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
272522.487307, 2761.539828 with index (162,): unable to solve 1phase PY flash  
with Tmin=271.195, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 278.759732256 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
283748.455552, 2761.539828 with index (163,): unable to solve 1phase PY flash
```

with Tmin=272.296, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could not find a solution because Smolar [281.765 J/mol/K] is above the maximum value of 278.42069771 J/mol/K

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
295436.853023, 2761.539828 with index (164,): unable to solve 1phase PY flash  
with Tmin=273.407, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 278.081522998 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
307606.728481, 2761.539828 with index (165,): unable to solve 1phase PY flash  
with Tmin=274.529, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 277.742202352 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
320277.915361, 2761.539828 with index (166,): unable to solve 1phase PY flash  
with Tmin=275.661, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 277.402729768 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
333471.064091, 2761.539828 with index (167,): unable to solve 1phase PY flash  
with Tmin=276.804, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 277.063098994 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
347207.675748, 2761.539828 with index (168,): unable to solve 1phase PY flash  
with Tmin=277.958, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 276.723303524 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
361510.137099, 2761.539828 with index (169,): unable to solve 1phase PY flash  
with Tmin=279.122, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 276.383336583 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
```

376401.757087, 2761.539828 with index (170,): unable to solve 1phase PY flash with Tmin=280.298, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could not find a solution because Smolar [281.765 J/mol/K] is above the maximum value of 276.043191118 J/mol/K

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
391906.804813, 2761.539828 with index (171,): unable to solve 1phase PY flash
with Tmin=281.485, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 275.702859785 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
408050.549092, 2761.539828 with index (172,): unable to solve 1phase PY flash
with Tmin=282.684, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 275.362334943 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
424859.299634, 2761.539828 with index (173,): unable to solve 1phase PY flash
with Tmin=283.894, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 275.021608633 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
442360.449918, 2761.539828 with index (174,): unable to solve 1phase PY flash
with Tmin=285.115, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 274.680672572 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
460582.521837, 2761.539828 with index (175,): unable to solve 1phase PY flash
with Tmin=286.349, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 274.339518137 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
479555.212183, 2761.539828 with index (176,): unable to solve 1phase PY flash
with Tmin=287.594, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 273.998136351 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
```

```

packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
499309.441041, 2761.539828 with index (177,): unable to solve 1phase PY flash
with Tmin=288.852, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 273.65651787 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
519877.402183, 2761.539828 with index (178,): unable to solve 1phase PY flash
with Tmin=290.122, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 273.314652967 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
541292.615531, 2761.539828 with index (179,): unable to solve 1phase PY flash
with Tmin=291.404, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 272.972531517 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
563589.981789, 2761.539828 with index (180,): unable to solve 1phase PY flash
with Tmin=292.699, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 272.630142979 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
586805.839316, 2761.539828 with index (181,): unable to solve 1phase PY flash
with Tmin=294.007, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 272.287476383 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
610978.023354, 2761.539828 with index (182,): unable to solve 1phase PY flash
with Tmin=295.327, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 271.944520309 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
636145.927684, 2761.539828 with index (183,): unable to solve 1phase PY flash
with Tmin=296.661, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 271.601262871 J/mol/K
    warnings.warn(

```



```

/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
662350.568825, 2761.539828 with index (184,): unable to solve 1phase PY flash
with Tmin=298.008, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 271.257691698 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
689634.652886, 2761.539828 with index (185,): unable to solve 1phase PY flash
with Tmin=299.368, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 270.913793912 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
718042.645159, 2761.539828 with index (186,): unable to solve 1phase PY flash
with Tmin=300.742, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 270.569556112 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
747620.842585, 2761.539828 with index (187,): unable to solve 1phase PY flash
with Tmin=302.13, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 270.22496435 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
778417.449208, 2761.539828 with index (188,): unable to solve 1phase PY flash
with Tmin=303.531, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 269.880004107 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
810482.654733, 2761.539828 with index (189,): unable to solve 1phase PY flash
with Tmin=304.947, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 269.534660278 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
843868.716318, 2761.539828 with index (190,): unable to solve 1phase PY flash
with Tmin=306.376, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 269.188917141 J/mol/K

```

```

warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
878630.043742, 2761.539828 with index (191,): unable to solve 1phase PY flash
with Tmin=307.821, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 268.842758333 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
914823.288076, 2761.539828 with index (192,): unable to solve 1phase PY flash
with Tmin=309.279, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 268.496166832 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
952507.434006, 2761.539828 with index (193,): unable to solve 1phase PY flash
with Tmin=310.753, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 268.149124922 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
991743.895967, 2761.539828 with index (194,): unable to solve 1phase PY flash
with Tmin=312.241, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 267.801614171 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1032596.618223, 2761.539828 with index (195,): unable to solve 1phase PY flash
with Tmin=313.745, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 267.4536154 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1075132.179086, 2761.539828 with index (196,): unable to solve 1phase PY flash
with Tmin=315.263, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 267.105108659 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1119419.899414, 2761.539828 with index (197,): unable to solve 1phase PY flash
with Tmin=316.797, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value

```

of 266.756073189 J/mol/K

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1165531.955586, 2761.539828 with index (198,): unable to solve 1phase PY flash  
with Tmin=318.347, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 266.406487399 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1213543.497130, 2761.539828 with index (199,): unable to solve 1phase PY flash  
with Tmin=319.912, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 266.056328829 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1263532.769195, 2761.539828 with index (200,): unable to solve 1phase PY flash  
with Tmin=321.493, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 265.705574118 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1315581.240067, 2761.539828 with index (201,): unable to solve 1phase PY flash  
with Tmin=323.09, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 265.35419897 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1369773.733940, 2761.539828 with index (202,): unable to solve 1phase PY flash  
with Tmin=324.703, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 265.002178119 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1426198.569157, 2761.539828 with index (203,): unable to solve 1phase PY flash  
with Tmin=326.333, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 264.649485294 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
1484947.702139, 2761.539828 with index (204,): unable to solve 1phase PY flash  
with Tmin=327.979, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
```

```

not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 264.296093179 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1546116.877253, 2761.539828 with index (205,): unable to solve 1phase PY flash
with Tmin=329.641, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 263.941973378 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1609805.782846, 2761.539828 with index (206,): unable to solve 1phase PY flash
with Tmin=331.321, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 263.587096372 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1676118.213707, 2761.539828 with index (207,): unable to solve 1phase PY flash
with Tmin=333.017, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 263.231431484 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1745162.240226, 2761.539828 with index (208,): unable to solve 1phase PY flash
with Tmin=334.729, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 262.874946834 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1817050.384517, 2761.539828 with index (209,): unable to solve 1phase PY flash
with Tmin=336.459, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 262.517609297 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1891899.803794, 2761.539828 with index (210,): unable to solve 1phase PY flash
with Tmin=338.206, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 262.159384466 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1969832.481308, 2761.539828 with index (211,): unable to solve 1phase PY flash

```

with Tmin=339.97, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could not find a solution because Smolar [281.765 J/mol/K] is above the maximum value of 261.800236601 J/mol/K

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2050975.425145, 2761.539828 with index (212,): unable to solve 1phase PY flash  
with Tmin=341.752, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 261.440128595 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2135460.875208, 2761.539828 with index (213,): unable to solve 1phase PY flash  
with Tmin=343.55, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 261.07902192 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2223426.518737, 2761.539828 with index (214,): unable to solve 1phase PY flash  
with Tmin=345.366, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 260.71687659 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2315015.714694, 2761.539828 with index (215,): unable to solve 1phase PY flash  
with Tmin=347.198, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 260.353651117 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2410377.727404, 2761.539828 with index (216,): unable to solve 1phase PY flash  
with Tmin=349.048, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 259.989302463 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2509667.969805, 2761.539828 with index (217,): unable to solve 1phase PY flash  
with Tmin=350.915, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 259.623786002 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
```

2613048.256735, 2761.539828 with index (218,): unable to solve 1phase PY flash with Tmin=352.798, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could not find a solution because Smolar [281.765 J/mol/K] is above the maximum value of 259.257055475 J/mol/K

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2720687.068639, 2761.539828 with index (219,): unable to solve 1phase PY flash
with Tmin=354.698, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 258.88906295 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2832759.826146, 2761.539828 with index (220,): unable to solve 1phase PY flash
with Tmin=356.615, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 258.519758786 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2949449.175955, 2761.539828 with index (221,): unable to solve 1phase PY flash
with Tmin=358.546, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 258.149091592 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3070945.288494, 2761.539828 with index (222,): unable to solve 1phase PY flash
with Tmin=360.493, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 257.777008199 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3197446.167850, 2761.539828 with index (223,): unable to solve 1phase PY flash
with Tmin=362.454, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 257.403453628 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3329157.974453, 2761.539828 with index (224,): unable to solve 1phase PY flash
with Tmin=364.429, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 257.028371063 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
```

```

packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3466295.361061, 2761.539828 with index (225,): unable to solve 1phase PY flash
with Tmin=366.415, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 256.651701836 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3609081.822587, 2761.539828 with index (226,): unable to solve 1phase PY flash
with Tmin=368.41, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 256.273385412 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3757750.060323, 2761.539828 with index (227,): unable to solve 1phase PY flash
with Tmin=370.411, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 255.893359386 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3912542.361185, 2761.539828 with index (228,): unable to solve 1phase PY flash
with Tmin=372.411, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 255.511559483 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4073710.992571, 2761.539828 with index (229,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 255.127919578 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4241518.613479, 2761.539828 with index (230,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 254.742371721 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4416238.702573, 2761.539828 with index (231,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 254.354846181 J/mol/K
    warnings.warn(

```

```

/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4598156.003873, 2761.539828 with index (232,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 253.965271505 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4787566.990804, 2761.539828 with index (233,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 253.573574593 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
4984780.349368, 2761.539828 with index (234,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 253.179680803 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
5190117.481213, 2761.539828 with index (235,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 252.783514074 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
5403913.027422, 2761.539828 with index (236,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 252.384997078 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
5626515.413890, 2761.539828 with index (237,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 251.98405141 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
5858287.419153, 2761.539828 with index (238,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 251.580597805 J/mol/K

```



```

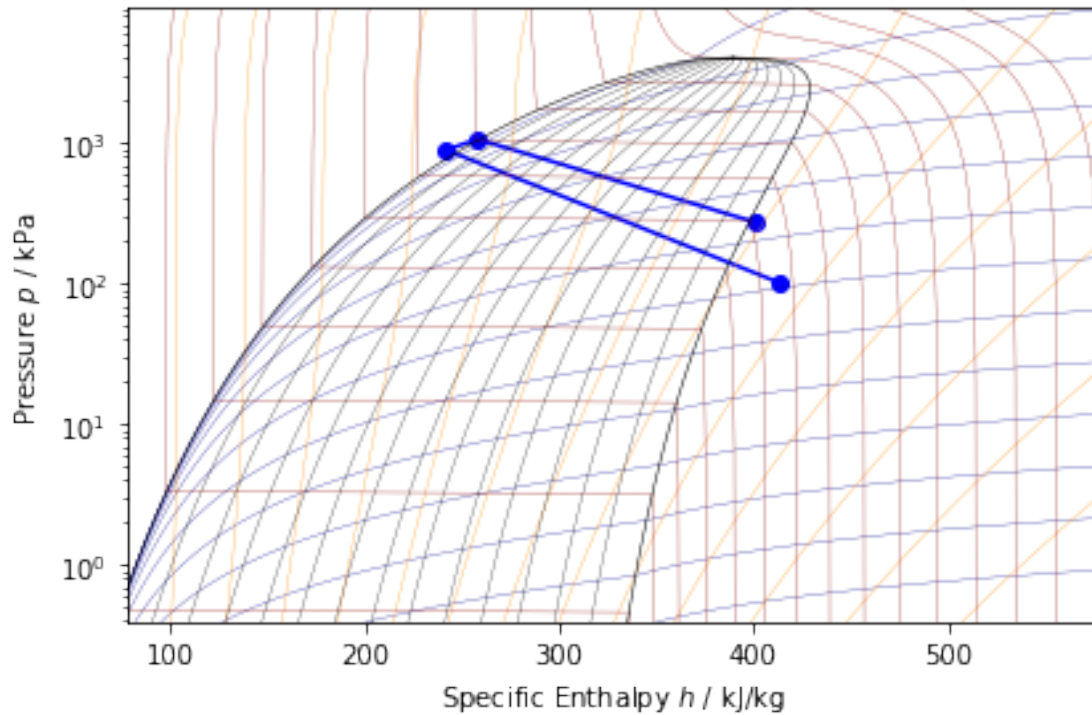
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6099606.765615, 2761.539828 with index (239,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 251.174556402 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6350866.735132, 2761.539828 with index (240,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 250.765847049 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6612476.809944, 2761.539828 with index (241,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 250.35438966 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6884863.340017, 2761.539828 with index (242,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 249.94010462 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7168470.237873, 2761.539828 with index (243,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 249.522913256 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7463759.702041, 2761.539828 with index (244,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 249.102738367 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7771212.970305, 2761.539828 with index (245,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value

```

```

of 248.679504822 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8091331.103991, 2761.539828 with index (246,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 248.253140233 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8424635.804550, 2761.539828 with index (247,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 247.823575697 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8771670.263783, 2761.539828 with index (248,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 247.390746622 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
9133000.049092, 2761.539828 with index (249,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 246.954593629 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:608: UserWarning: Please use "calc_sat_range"
to calculate saturation and isoquality lines. Input ranges are discarded.
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Plots.py:217: UserWarning: Detected an incomplete phase
envelope, fixing it numerically.
    warnings.warn("Detected an incomplete phase envelope, fixing it numerically.")

```



2.2 Ciclo de refrigeração

```
[ ]: ph_plot = PropertyPlot('R134a', 'Ph')
ph_plot.calc_isolines()
ax = ph_plot.axis
ax.plot(hb_prop_df.Entalpia/10**3,
        hb_prop_df.Pressão/10**3,
        'o',
        hb_prop_df.Entalpia/10**3,
        hb_prop_df.Pressão/10**3,
        '-',
        color='b',
)
ph_plot.show()
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8771670.263783, 2426.329225 with index (248,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [247.563 J/mol/K] is above the maximum value
of 247.390746622 J/mol/K
warnings.warn(
```

```

/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
9133000.049092, 2426.329225 with index (249,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [247.563 J/mol/K] is above the maximum value
of 246.954593629 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1426198.569157, 2593.934527 with index (203,): unable to solve 1phase PY flash
with Tmin=326.333, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 264.649485294 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1484947.702139, 2593.934527 with index (204,): unable to solve 1phase PY flash
with Tmin=327.979, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 264.296093179 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1546116.877253, 2593.934527 with index (205,): unable to solve 1phase PY flash
with Tmin=329.641, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 263.941973378 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1609805.782846, 2593.934527 with index (206,): unable to solve 1phase PY flash
with Tmin=331.321, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 263.587096372 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1676118.213707, 2593.934527 with index (207,): unable to solve 1phase PY flash
with Tmin=333.017, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 263.231431484 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1745162.240226, 2593.934527 with index (208,): unable to solve 1phase PY flash
with Tmin=334.729, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 262.874946834 J/mol/K

```

```

warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1817050.384517, 2593.934527 with index (209,): unable to solve 1phase PY flash
with Tmin=336.459, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 262.517609297 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1891899.803794, 2593.934527 with index (210,): unable to solve 1phase PY flash
with Tmin=338.206, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 262.159384466 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1969832.481308, 2593.934527 with index (211,): unable to solve 1phase PY flash
with Tmin=339.97, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 261.800236601 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2050975.425145, 2593.934527 with index (212,): unable to solve 1phase PY flash
with Tmin=341.752, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 261.440128595 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2135460.875208, 2593.934527 with index (213,): unable to solve 1phase PY flash
with Tmin=343.55, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 261.07902192 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2223426.518737, 2593.934527 with index (214,): unable to solve 1phase PY flash
with Tmin=345.366, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 260.71687659 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2315015.714694, 2593.934527 with index (215,): unable to solve 1phase PY flash
with Tmin=347.198, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value

```

```

of 260.353651117 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2410377.727404, 2593.934527 with index (216,): unable to solve 1phase PY flash
with Tmin=349.048, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 259.989302463 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2509667.969805, 2593.934527 with index (217,): unable to solve 1phase PY flash
with Tmin=350.915, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 259.623786002 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2613048.256735, 2593.934527 with index (218,): unable to solve 1phase PY flash
with Tmin=352.798, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 259.257055475 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2720687.068639, 2593.934527 with index (219,): unable to solve 1phase PY flash
with Tmin=354.698, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 258.88906295 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2832759.826146, 2593.934527 with index (220,): unable to solve 1phase PY flash
with Tmin=356.615, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 258.519758786 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2949449.175955, 2593.934527 with index (221,): unable to solve 1phase PY flash
with Tmin=358.546, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 258.149091592 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
3070945.288494, 2593.934527 with index (222,): unable to solve 1phase PY flash
with Tmin=360.493, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could

```

not find a solution because Smolar [264.664 J/mol/K] is above the maximum value of 257.777008199 J/mol/K

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3197446.167850, 2593.934527 with index (223,): unable to solve 1phase PY flash  
with Tmin=362.454, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 257.403453628 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3329157.974453, 2593.934527 with index (224,): unable to solve 1phase PY flash  
with Tmin=364.429, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 257.028371063 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3466295.361061, 2593.934527 with index (225,): unable to solve 1phase PY flash  
with Tmin=366.415, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 256.651701836 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3609081.822587, 2593.934527 with index (226,): unable to solve 1phase PY flash  
with Tmin=368.41, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 256.273385412 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3757750.060323, 2593.934527 with index (227,): unable to solve 1phase PY flash  
with Tmin=370.411, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 255.893359386 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3912542.361185, 2593.934527 with index (228,): unable to solve 1phase PY flash  
with Tmin=372.411, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 255.511559483 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4073710.992571, 2593.934527 with index (229,): unable to solve 1phase PY flash
```

with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could not find a solution because Smolar [264.664 J/mol/K] is above the maximum value of 255.127919578 J/mol/K

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4241518.613479, 2593.934527 with index (230,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 254.742371721 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4416238.702573, 2593.934527 with index (231,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 254.354846181 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4598156.003873, 2593.934527 with index (232,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 253.965271505 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4787566.990804, 2593.934527 with index (233,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 253.573574593 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4984780.349368, 2593.934527 with index (234,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 253.179680803 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
5190117.481213, 2593.934527 with index (235,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 252.783514074 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
```


5403913.027422, 2593.934527 with index (236,): unable to solve 1phase PY flash with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could not find a solution because Smolar [264.664 J/mol/K] is above the maximum value of 252.384997078 J/mol/K

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
5626515.413890, 2593.934527 with index (237,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 251.98405141 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
5858287.419153, 2593.934527 with index (238,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 251.580597805 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
6099606.765615, 2593.934527 with index (239,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 251.174556402 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
6350866.735132, 2593.934527 with index (240,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 250.765847049 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
6612476.809944, 2593.934527 with index (241,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 250.35438966 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
6884863.340017, 2593.934527 with index (242,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value  
of 249.94010462 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
```

```

packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7168470.237873, 2593.934527 with index (243,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 249.522913256 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7463759.702041, 2593.934527 with index (244,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 249.102738367 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7771212.970305, 2593.934527 with index (245,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 248.679504822 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8091331.103991, 2593.934527 with index (246,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 248.253140233 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8424635.804550, 2593.934527 with index (247,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 247.823575697 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8771670.263783, 2593.934527 with index (248,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 247.390746622 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
9133000.049092, 2593.934527 with index (249,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [264.664 J/mol/K] is above the maximum value
of 246.954593629 J/mol/K
    warnings.warn(

```

```

/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
197311.794353, 2761.539828 with index (154,): unable to solve 1phase PY flash
with Tmin=262.741, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 281.467583575 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
205439.622480, 2761.539828 with index (155,): unable to solve 1phase PY flash
with Tmin=263.764, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 281.129488256 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
213902.258723, 2761.539828 with index (156,): unable to solve 1phase PY flash
with Tmin=264.797, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 280.791291424 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
222713.494770, 2761.539828 with index (157,): unable to solve 1phase PY flash
with Tmin=265.839, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 280.452988902 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
231887.690428, 2761.539828 with index (158,): unable to solve 1phase PY flash
with Tmin=266.891, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 280.114576339 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
241439.797026, 2761.539828 with index (159,): unable to solve 1phase PY flash
with Tmin=267.952, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 279.776049206 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
251385.381778, 2761.539828 with index (160,): unable to solve 1phase PY flash
with Tmin=269.023, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 279.437402788 J/mol/K

```

```

warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
261740.653156, 2761.539828 with index (161,): unable to solve 1phase PY flash
with Tmin=270.104, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 279.098632175 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
272522.487307, 2761.539828 with index (162,): unable to solve 1phase PY flash
with Tmin=271.195, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 278.759732256 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
283748.455552, 2761.539828 with index (163,): unable to solve 1phase PY flash
with Tmin=272.296, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 278.42069771 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
295436.853023, 2761.539828 with index (164,): unable to solve 1phase PY flash
with Tmin=273.407, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 278.081522998 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
307606.728481, 2761.539828 with index (165,): unable to solve 1phase PY flash
with Tmin=274.529, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 277.742202352 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
320277.915361, 2761.539828 with index (166,): unable to solve 1phase PY flash
with Tmin=275.661, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 277.402729768 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
333471.064091, 2761.539828 with index (167,): unable to solve 1phase PY flash
with Tmin=276.804, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value

```

of 277.063098994 J/mol/K

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
347207.675748, 2761.539828 with index (168,): unable to solve 1phase PY flash  
with Tmin=277.958, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 276.723303524 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
361510.137099, 2761.539828 with index (169,): unable to solve 1phase PY flash  
with Tmin=279.122, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 276.383336583 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
376401.757087, 2761.539828 with index (170,): unable to solve 1phase PY flash  
with Tmin=280.298, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 276.043191118 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
391906.804813, 2761.539828 with index (171,): unable to solve 1phase PY flash  
with Tmin=281.485, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 275.702859785 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
408050.549092, 2761.539828 with index (172,): unable to solve 1phase PY flash  
with Tmin=282.684, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 275.362334943 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
424859.299634, 2761.539828 with index (173,): unable to solve 1phase PY flash  
with Tmin=283.894, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 275.021608633 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
442360.449918, 2761.539828 with index (174,): unable to solve 1phase PY flash  
with Tmin=285.115, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
```

not find a solution because Smolar [281.765 J/mol/K] is above the maximum value of 274.680672572 J/mol/K

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
460582.521837, 2761.539828 with index (175,): unable to solve 1phase PY flash  
with Tmin=286.349, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 274.339518137 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
479555.212183, 2761.539828 with index (176,): unable to solve 1phase PY flash  
with Tmin=287.594, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 273.998136351 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
499309.441041, 2761.539828 with index (177,): unable to solve 1phase PY flash  
with Tmin=288.852, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 273.65651787 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
519877.402183, 2761.539828 with index (178,): unable to solve 1phase PY flash  
with Tmin=290.122, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 273.314652967 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
541292.615531, 2761.539828 with index (179,): unable to solve 1phase PY flash  
with Tmin=291.404, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 272.972531517 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
563589.981789, 2761.539828 with index (180,): unable to solve 1phase PY flash  
with Tmin=292.699, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 272.630142979 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
586805.839316, 2761.539828 with index (181,): unable to solve 1phase PY flash
```

with Tmin=294.007, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could not find a solution because Smolar [281.765 J/mol/K] is above the maximum value of 272.287476383 J/mol/K

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
610978.023354, 2761.539828 with index (182,): unable to solve 1phase PY flash  
with Tmin=295.327, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 271.944520309 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
636145.927684, 2761.539828 with index (183,): unable to solve 1phase PY flash  
with Tmin=296.661, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 271.601262871 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
662350.568825, 2761.539828 with index (184,): unable to solve 1phase PY flash  
with Tmin=298.008, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 271.257691698 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
689634.652886, 2761.539828 with index (185,): unable to solve 1phase PY flash  
with Tmin=299.368, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 270.913793912 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
718042.645159, 2761.539828 with index (186,): unable to solve 1phase PY flash  
with Tmin=300.742, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 270.569556112 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
747620.842585, 2761.539828 with index (187,): unable to solve 1phase PY flash  
with Tmin=302.13, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 270.22496435 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
```

```

778417.449208, 2761.539828 with index (188,): unable to solve 1phase PY flash
with Tmin=303.531, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 269.880004107 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
810482.654733, 2761.539828 with index (189,): unable to solve 1phase PY flash
with Tmin=304.947, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 269.534660278 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
843868.716318, 2761.539828 with index (190,): unable to solve 1phase PY flash
with Tmin=306.376, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 269.188917141 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
878630.043742, 2761.539828 with index (191,): unable to solve 1phase PY flash
with Tmin=307.821, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 268.842758333 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
914823.288076, 2761.539828 with index (192,): unable to solve 1phase PY flash
with Tmin=309.279, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 268.496166832 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
952507.434006, 2761.539828 with index (193,): unable to solve 1phase PY flash
with Tmin=310.753, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 268.149124922 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
991743.895967, 2761.539828 with index (194,): unable to solve 1phase PY flash
with Tmin=312.241, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 267.801614171 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-

```



```

packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1032596.618223, 2761.539828 with index (195,): unable to solve 1phase PY flash
with Tmin=313.745, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 267.4536154 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1075132.179086, 2761.539828 with index (196,): unable to solve 1phase PY flash
with Tmin=315.263, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 267.105108659 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1119419.899414, 2761.539828 with index (197,): unable to solve 1phase PY flash
with Tmin=316.797, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 266.756073189 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1165531.955586, 2761.539828 with index (198,): unable to solve 1phase PY flash
with Tmin=318.347, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 266.406487399 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1213543.497130, 2761.539828 with index (199,): unable to solve 1phase PY flash
with Tmin=319.912, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 266.056328829 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1263532.769195, 2761.539828 with index (200,): unable to solve 1phase PY flash
with Tmin=321.493, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 265.705574118 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1315581.240067, 2761.539828 with index (201,): unable to solve 1phase PY flash
with Tmin=323.09, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 265.35419897 J/mol/K
    warnings.warn(

```

```

/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1369773.733940, 2761.539828 with index (202,): unable to solve 1phase PY flash
with Tmin=324.703, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 265.002178119 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1426198.569157, 2761.539828 with index (203,): unable to solve 1phase PY flash
with Tmin=326.333, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 264.649485294 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1484947.702139, 2761.539828 with index (204,): unable to solve 1phase PY flash
with Tmin=327.979, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 264.296093179 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1546116.877253, 2761.539828 with index (205,): unable to solve 1phase PY flash
with Tmin=329.641, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 263.941973378 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1609805.782846, 2761.539828 with index (206,): unable to solve 1phase PY flash
with Tmin=331.321, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 263.587096372 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1676118.213707, 2761.539828 with index (207,): unable to solve 1phase PY flash
with Tmin=333.017, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 263.231431484 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1745162.240226, 2761.539828 with index (208,): unable to solve 1phase PY flash
with Tmin=334.729, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 262.874946834 J/mol/K

```

```

warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1817050.384517, 2761.539828 with index (209,): unable to solve 1phase PY flash
with Tmin=336.459, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 262.517609297 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1891899.803794, 2761.539828 with index (210,): unable to solve 1phase PY flash
with Tmin=338.206, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 262.159384466 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
1969832.481308, 2761.539828 with index (211,): unable to solve 1phase PY flash
with Tmin=339.97, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 261.800236601 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2050975.425145, 2761.539828 with index (212,): unable to solve 1phase PY flash
with Tmin=341.752, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 261.440128595 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2135460.875208, 2761.539828 with index (213,): unable to solve 1phase PY flash
with Tmin=343.55, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 261.07902192 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2223426.518737, 2761.539828 with index (214,): unable to solve 1phase PY flash
with Tmin=345.366, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 260.71687659 J/mol/K
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
2315015.714694, 2761.539828 with index (215,): unable to solve 1phase PY flash
with Tmin=347.198, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value

```

of 260.353651117 J/mol/K

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2410377.727404, 2761.539828 with index (216,): unable to solve 1phase PY flash  
with Tmin=349.048, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 259.989302463 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2509667.969805, 2761.539828 with index (217,): unable to solve 1phase PY flash  
with Tmin=350.915, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 259.623786002 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2613048.256735, 2761.539828 with index (218,): unable to solve 1phase PY flash  
with Tmin=352.798, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 259.257055475 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2720687.068639, 2761.539828 with index (219,): unable to solve 1phase PY flash  
with Tmin=354.698, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 258.88906295 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2832759.826146, 2761.539828 with index (220,): unable to solve 1phase PY flash  
with Tmin=356.615, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 258.519758786 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
2949449.175955, 2761.539828 with index (221,): unable to solve 1phase PY flash  
with Tmin=358.546, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 258.149091592 J/mol/K
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3070945.288494, 2761.539828 with index (222,): unable to solve 1phase PY flash  
with Tmin=360.493, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
```

not find a solution because Smolar [281.765 J/mol/K] is above the maximum value of 257.777008199 J/mol/K

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3197446.167850, 2761.539828 with index (223,): unable to solve 1phase PY flash  
with Tmin=362.454, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 257.403453628 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3329157.974453, 2761.539828 with index (224,): unable to solve 1phase PY flash  
with Tmin=364.429, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 257.028371063 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3466295.361061, 2761.539828 with index (225,): unable to solve 1phase PY flash  
with Tmin=366.415, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 256.651701836 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3609081.822587, 2761.539828 with index (226,): unable to solve 1phase PY flash  
with Tmin=368.41, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 256.273385412 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3757750.060323, 2761.539828 with index (227,): unable to solve 1phase PY flash  
with Tmin=370.411, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 255.893359386 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
3912542.361185, 2761.539828 with index (228,): unable to solve 1phase PY flash  
with Tmin=372.411, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 255.511559483 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4073710.992571, 2761.539828 with index (229,): unable to solve 1phase PY flash
```

with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could not find a solution because Smolar [281.765 J/mol/K] is above the maximum value of 255.127919578 J/mol/K

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4241518.613479, 2761.539828 with index (230,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 254.742371721 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4416238.702573, 2761.539828 with index (231,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 254.354846181 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4598156.003873, 2761.539828 with index (232,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 253.965271505 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4787566.990804, 2761.539828 with index (233,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 253.573574593 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
4984780.349368, 2761.539828 with index (234,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 253.179680803 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs  
5190117.481213, 2761.539828 with index (235,): unable to solve 1phase PY flash  
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could  
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value  
of 252.783514074 J/mol/K
```

```
warnings.warn(
```

```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
```

5403913.027422, 2761.539828 with index (236,): unable to solve 1phase PY flash with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could not find a solution because Smolar [281.765 J/mol/K] is above the maximum value of 252.384997078 J/mol/K

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
5626515.413890, 2761.539828 with index (237,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 251.98405141 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
5858287.419153, 2761.539828 with index (238,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 251.580597805 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6099606.765615, 2761.539828 with index (239,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 251.174556402 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6350866.735132, 2761.539828 with index (240,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 250.765847049 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6612476.809944, 2761.539828 with index (241,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 250.35438966 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
6884863.340017, 2761.539828 with index (242,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 249.94010462 J/mol/K
```

```
warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
```

```

packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7168470.237873, 2761.539828 with index (243,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 249.522913256 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7463759.702041, 2761.539828 with index (244,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 249.102738367 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
7771212.970305, 2761.539828 with index (245,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 248.679504822 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8091331.103991, 2761.539828 with index (246,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 248.253140233 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8424635.804550, 2761.539828 with index (247,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 247.823575697 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
8771670.263783, 2761.539828 with index (248,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 247.390746622 J/mol/K
    warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:655: UserWarning: An error occurred for inputs
9133000.049092, 2761.539828 with index (249,): unable to solve 1phase PY flash
with Tmin=169.849, Tmax=682.5 due to error: HSU_P_flash_singlephase_Brent could
not find a solution because Smolar [281.765 J/mol/K] is above the maximum value
of 246.954593629 J/mol/K
    warnings.warn(

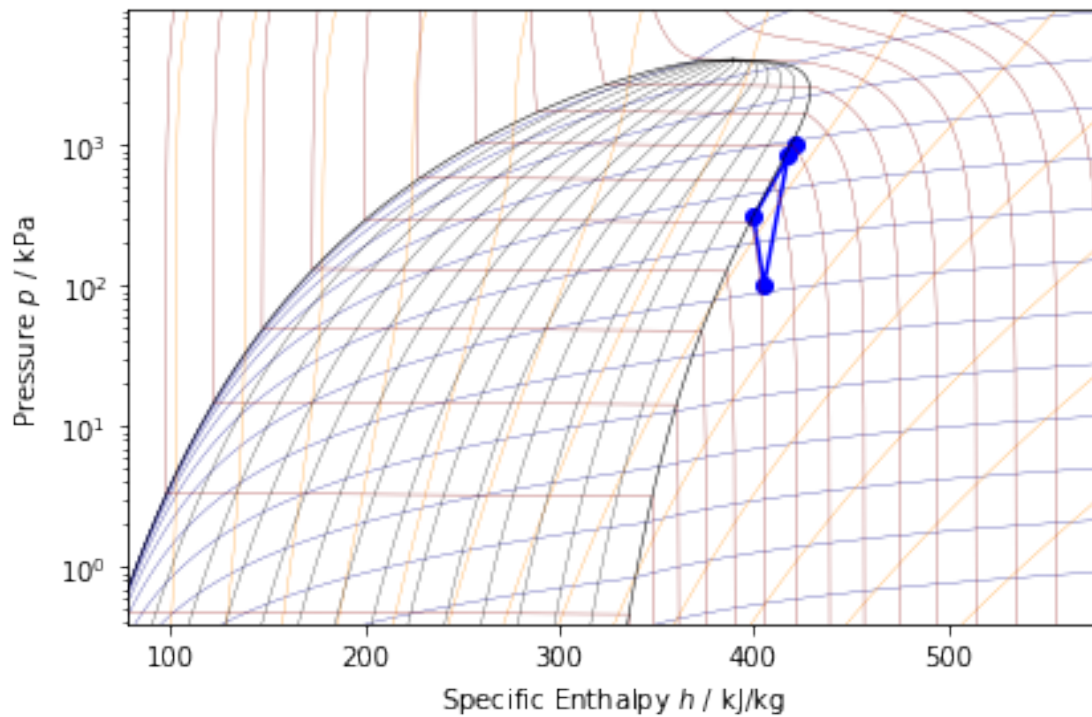
```



```
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Common.py:608: UserWarning: Please use "calc_sat_range"  
to calculate saturation and isoquality lines. Input ranges are discarded.
```

```
warnings.warn(  
/home/thiago/anaconda3/envs/default/lib/python3.9/site-  
packages/CoolProp/Plots/Plots.py:217: UserWarning: Detected an incomplete phase  
envelope, fixing it numerically.
```

```
warnings.warn("Detected an incomplete phase envelope, fixing it numerically.")
```



3 Análise de COP

3.1 ciclo de refrigeração

```
[ ]: # definindo variáveis de entrada  
  
# refrigerador  
  
P2_eval = np.linspace(100000,0.2e7)  
  
H_list = []  
  
for P in P2_eval:
```

```

    H = PropsSI('H','P',(P),'T',(T2_r),'R134a')
    H_list.append(H)

#calculo de COP

COP_list = []

for H in H_list:
    COP = (H1_r - H4_r)/(H - H1_r)
    COP_list.append(COP)

# plotagem gráfico

fig = plt.figure(figsize=[16, 9])
fig.suptitle('Gráfico do COP em função da pressão', fontsize=16)

# Plotando 2D

ax = fig.add_subplot(1, 1, 1)

ax.set_xlabel('$P(Pa)$',fontsize=16)
ax.set_ylabel("$COP$",fontsize=16)

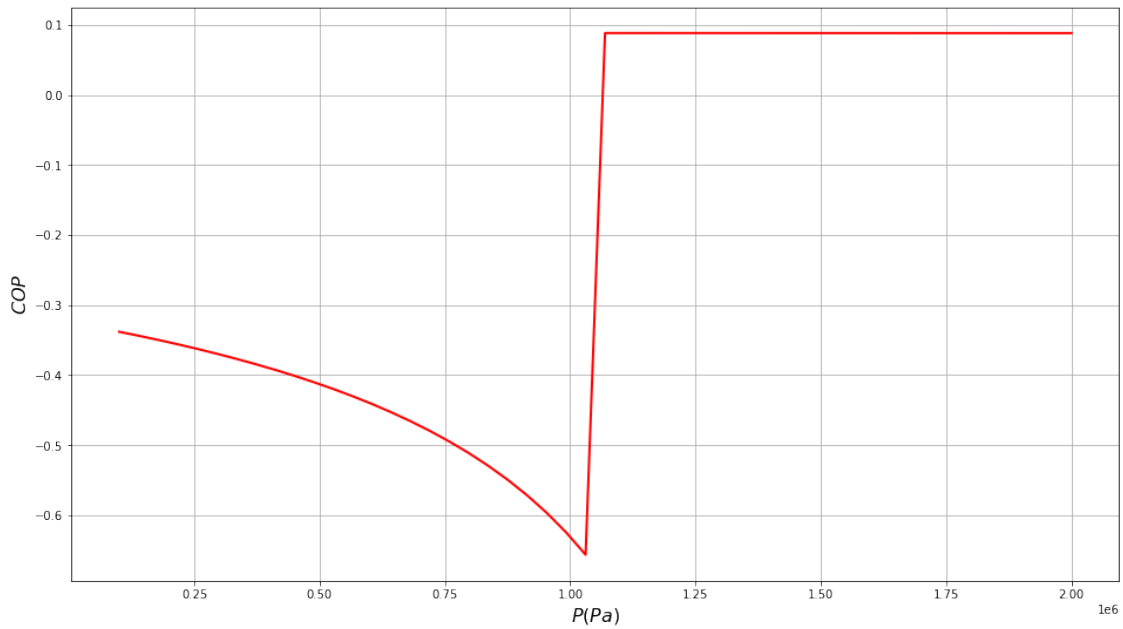
ax.plot(P2_eval, COP_list, 'r', linewidth=2)

ax.grid()

plt.show()

```

Gráfico do COP em função da pressão



3.2 ciclo da bomba do calor

```
[ ]: # definindo variáveis de entrada

# refrigerador

P_eval = np.linspace(100000,0.2e7)

H_list = []

for P in P_eval:
    H = PropsSI('H','P',(P),'T',(T2_r),'R134a')
    H_list.append(H)

#calculo de COP

COP_list = []

for H in H_list:
    COP = (H4_H - H)/(H - H2_H)
    COP_list.append(COP)

# plotagem gráfico
```

```

fig = plt.figure(figsize=[16, 9])
fig.suptitle('Gráfico do COP em função da pressão', fontsize=16)

# Plotando 2D

ax = fig.add_subplot(1, 1, 1)

ax.set_xlabel('$P(Pa)$', fontsize=16)
ax.set_ylabel("$COP$", fontsize=16)

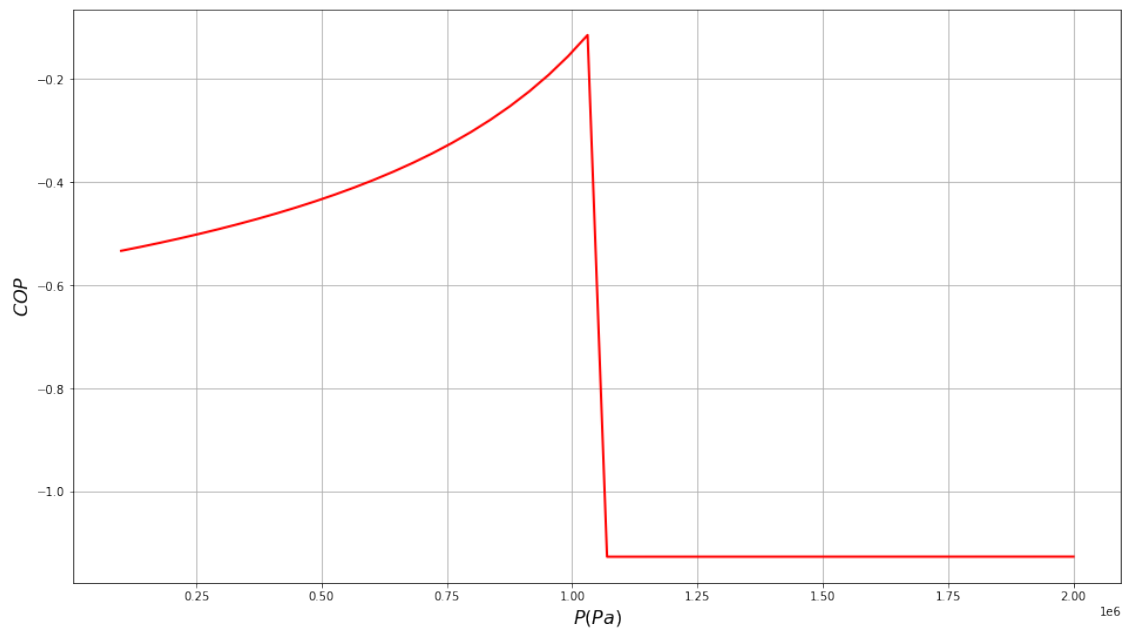
ax.plot(P2_eval, COP_list, 'r', linewidth=2)

ax.grid()

plt.show()

```

Gráfico do COP em função da pressão



4 Cálculo de pressão

```
[ ]: #dados do compressor

I = 3.5
V = 127

#incerteza do compressor

u_comp = (127**2 * 0.5**2)**0.5

P_comp = V * I

print("P_comp = {:.3f} +/- {:.3f}) W".format(P_comp, u_comp))
```

P_comp = (444.500 +/- 63.500) W