tratamento-de-dados

July 12, 2022

1 Importanto bibliotecas utilizadas

```
#### Definição do Frame Work ####

from CoolProp.CoolProp import PropsSI
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from CoolProp.Plots import PropertyPlot

import utils
```

```
from importlib import reload
reload(utils)
```

```
<module 'utils' from '/home/thiago/GitHub/Engenharia_Mecanica_UFJF/12_periodo/re
frigeracao/laboratorio/utils.py'>
```

2 Experimento 4

2.1 Tubo capilar

```
# definicao de dados experimentais
Temp4_1 = {
    'Ts1': 6,
    'Ts2': 49,
    'Ts3': 33,
    'Ts4': 5,
}

Press4_1 = {
    'Ps1': 2,
    'Ps2': 12.5,
    'Ps3': 13,
    'Ps4': 3,
```

```
}

I = 4

Q = 0.48
```

```
[ ]: exp4_1 = utils.Experimento(Temp4_1,Press4_1,I,Q)
     exp4_1.conv_input_df
```

```
[ ]:      Temperatura        Pressao         Entalpia        Densidade        Calor Esp.  \
     0    6.0 +/- 0.5    3.0 +/- 0.5   403.7 +/- 0.4    14.4 +/- 0.0    893.5 +/- 0.4
     1   61.0 +/- 0.5   13.5 +/- 0.5   435.9 +/- 0.5    63.0 +/- 0.2   1164.8 +/- 3.0
     2   33.0 +/- 0.5   14.0 +/- 0.5   246.0 +/- 0.7  1179.5 +/- 2.0   1452.2 +/- 2.5
     3    5.0 +/- 0.5    3.0 +/- 0.5   246.0 +/- 0.7    62.8 +/- 1.0    894.5 +/- 0.5

                 Temp. Sat.
     0  273.94444 +/- 5e-05
     1  324.14941 +/- 1e-05
     2  325.61057 +/- 1e-05
     3  273.94444 +/- 5e-05
```

```
[ ]: exp4_1.analise_defaut()
     exp4_1.output_df
```

```
[ ]:          Propriedade              Valor
     0          delta_T_eva       1.0 +/- 0.7
     1         delta_T_cond     -28.0 +/- 0.7
     2          delta_P_eva       0.0 +/- 0.7
     3         delta_P_cond       0.5 +/- 0.7
     4                  COP  4.9061 +/- 0.0049
     5       vazao_massica  0.00445 +/- 1e-05
     6          calor_evap    0.7023 +/- 0.004
     7   sub_resfriamento      19.5 +/- 0.7
     8     sup_aquecimento       5.2 +/- 0.7
```

2.2 Válvula de expansão sem ajuste

```
[ ]: # definicao de dados experimentais
     Temp4_2 = {
         'Ts1': 6,
         'Ts2': 42,
         'Ts3': 40,
         'Ts4': 5,
     }

     Press4_2 = {
```

```
        'Ps1': 2,
        'Ps2': 10.7,
        'Ps3': 10,
        'Ps4': 3,
    }

    I = 4

    Q = 0.42
```

```
[ ]: exp4_2 = utils.Experimento(Temp4_2,Press4_2,I,Q)
     exp4_2.conv_input_df
```

```
[ ]:      Temperatura         Pressao         Entalpia         Densidade       Calor Esp.  \
     0   6.0 +/- 0.5    3.0 +/- 0.5   403.7 +/- 0.4    14.4 +/- 0.0    893.5 +/- 0.4
     1  55.0 +/- 0.5   11.7 +/- 0.5   432.8 +/- 0.5    54.4 +/- 0.2   1123.6 +/- 2.4
     2  40.0 +/- 0.5   11.0 +/- 0.5   256.4 +/- 0.7  1147.5 +/- 2.2   1496.7 +/- 3.2
     3   5.0 +/- 0.5    3.0 +/- 0.5   256.4 +/- 0.7    51.6 +/- 0.7    894.5 +/- 0.5

              Temp. Sat.
     0   273.94444 +/- 5e-05
     1   318.52738 +/- 2e-05
     2   316.16514 +/- 2e-05
     3   273.94444 +/- 5e-05
```

```
[ ]: exp4_2.analise_defaut()
     exp4_2.output_df
```

```
[ ]:          Propriedade            Valor
     0         delta_T_eva       1.0 +/- 0.7
     1        delta_T_cond     -15.0 +/- 0.7
     2         delta_P_eva       0.0 +/- 0.7
     3        delta_P_cond      -0.7 +/- 0.7
     4                 COP  5.0687 +/- 0.0056
     5       vazao_massica  0.00379 +/- 1e-05
     6          calor_evap  0.5585 +/- 0.0035
     7     sub_resfriamento       3.0 +/- 0.7
     8      sup_aquecimento       5.2 +/- 0.7
```

2.3   Válvula de expansão com ajuste

```
[ ]: # definicao de dados experimentais
     Temp4_3 = {
         'Ts1': 6,
         'Ts2': 49,
         'Ts3': 33,
```

```
        'Ts4': 5,
    }

    Press4_3 = {
        'Ps1': 2,
        'Ps2': 12.5,
        'Ps3': 13,
        'Ps4': 3,
    }

    I = 4

    Q = 0.48
```

```
[ ]: exp4_3 = utils.Experimento(Temp4_3,Press4_3,I,Q)
     exp4_3.conv_input_df
```

```
[ ]:    Temperatura        Pressao        Entalpia        Densidade        Calor Esp.  \
     0   6.0 +/- 0.5   3.0 +/- 0.5   403.7 +/- 0.4     14.4 +/- 0.0    893.5 +/- 0.4
     1  61.0 +/- 0.5  13.5 +/- 0.5   435.9 +/- 0.5     63.0 +/- 0.2   1164.8 +/- 3.0
     2  33.0 +/- 0.5  14.0 +/- 0.5   246.0 +/- 0.7   1179.5 +/- 2.0   1452.2 +/- 2.5
     3   5.0 +/- 0.5   3.0 +/- 0.5   246.0 +/- 0.7     62.8 +/- 1.0    894.5 +/- 0.5

              Temp. Sat.
     0  273.94444 +/- 5e-05
     1  324.14941 +/- 1e-05
     2  325.61057 +/- 1e-05
     3  273.94444 +/- 5e-05
```

```
[ ]: exp4_3.analise_defaut()
     exp4_3.output_df
```

```
[ ]:          Propriedade              Valor
     0        delta_T_eva        1.0 +/- 0.7
     1       delta_T_cond      -28.0 +/- 0.7
     2        delta_P_eva        0.0 +/- 0.7
     3       delta_P_cond        0.5 +/- 0.7
     4                COP     4.9061 +/- 0.0049
     5      vazao_massica    0.00445 +/- 1e-05
     6         calor_evap     0.7023 +/- 0.004
     7   sub_resfriamento       19.5 +/- 0.7
     8    sup_aquecimento        5.2 +/- 0.7
```

2.4 Plots

2.4.1 Diagrama PH

```python
ph_plot = PropertyPlot(exp4_1.fluido, "Ph")
ph_plot.calc_isolines()
fig = ph_plot.figure
fig.set_size_inches(16, 9)
ax = ph_plot.axis

color_list =['blue', "red", "green"]
exp_list = [exp4_1,exp4_2,exp4_3]
legend_list = [
    "Tubo Capilar",
    "Válvula sem",
    "Válvula com"
]
marker_list =['-','--','-.']

for exp, col, legend, mark in zip(exp_list,color_list,legend_list, marker_list):

    print()

    # definindo listas para fechar o ciclo
    plot_entalpia = exp.input_df.Entalpia.to_list()
    plot_pressao = exp.input_df.Pressao.to_list()

    plot_entalpia.append(exp.input_df.Entalpia[0])
    plot_pressao.append(exp.input_df.Pressao[0])

    plot_entalpia = [h / 10 ** 3 for h in plot_entalpia]
    plot_pressao = [h / 10 ** 3 for h in plot_pressao]

    ax.scatter(
        plot_entalpia,
        plot_pressao,
        color=col)
    ax.plot(
        plot_entalpia,
        plot_pressao,
        mark,
        color=col,
        label=legend
    )

    ax.tick_params(axis="x", labelsize=24)
    ax.tick_params(axis="y", labelsize=24)
```

```python
    ax.set_xlabel("Entalpia específica(kJ/kg)", fontsize=24)
    ax.set_ylabel("Pressão (kPa)", fontsize=24)
    ax.legend()

    # anotando os pontos no diagrama

    if exp.cool:
        ax.annotate(
            "S1",
            (
                exp.input_df.Entalpia[0] / 1e3 + 5,
                exp.input_df.Pressao[0] / 1e3 + 5,
            ),
            size=24,
        )
        ax.annotate(
            "S2",
            (
                exp.input_df.Entalpia[1] / 1e3 + 5,
                exp.input_df.Pressao[1] / 1e3 + 5,
            ),
            size=24,
        )
        ax.annotate(
            "S3",
            (
                exp.input_df.Entalpia[2] / 1e3 + 5,
                exp.input_df.Pressao[2] / 1e3 + 5,
            ),
            size=24,
        )
        ax.annotate(
            "S4",
            (
                exp.input_df.Entalpia[3] / 1e3 + 5,
                exp.input_df.Pressao[3] / 1e3 + 5,
            ),
            size=24,
        )

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
```
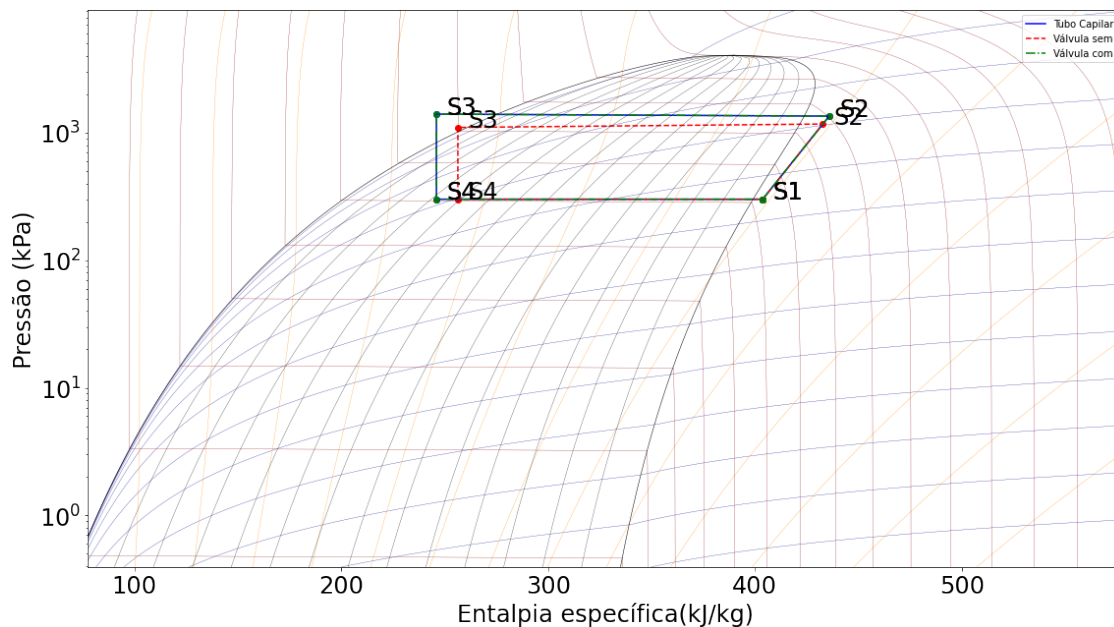
```
of 246.954593629 J/mol/K
  warnings.warn(
/home/thiago/anaconda3/envs/default/lib/python3.9/site-
packages/CoolProp/Plots/Common.py:608: UserWarning: Please use "calc_sat_range"
to calculate saturation and isoquality lines. Input ranges are discarded.
  warnings.warn(
```

```
/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.")
```


2.4.2 COP em função do grau de superaquecimento

```
color_list =['blue', "red", "green"]
exp_list = [exp4_1,exp4_2,exp4_3]
legend_list = [
    "Tubo Capilar",
    "Válvula sem",
    "Válvula com"
]
marker_list =['-','--','-.']
```

28

```python
# plotando resultados
fig = plt.figure(figsize=[16, 9])
fig.suptitle("COP em função do superaquecimento", fontsize=24)

# Plotando 2D

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

ax.tick_params(axis="x", labelsize=24)
ax.tick_params(axis="y", labelsize=24)

ax.set_xlabel("$Superaquecimento~[^oC]$", fontsize=24)
ax.set_ylabel("$COP$", fontsize=24)

min = 1

max = 10

for exp, col, legend, mark in zip(exp_list,color_list,legend_list, marker_list):
    sub_res_list = np.linspace(min, max, 250)
    original_Hs1 = exp.Hs1
    original_Hs2 = exp.Hs2
    results_list = []
    T_liq_sat = PropsSI("T", "P", exp.Ps1, "Q", 1, exp.fluido)

    for sub_res in sub_res_list:
        Ts1 = T_liq_sat + sub_res
        S1 = exp.calc_prop_error(
            "S",
            ("P", exp.Ps1, exp.Press_error),
            ("T", Ts1, 0),
        )
        exp.Hs2 = exp.calc_prop_error(
            "H", ("P", exp.Ps2, exp.Press_error), ("S", S1["med"], S1["erro"])
        )

        exp.Hs1 = exp.calc_prop_error(
                "H",
                ("T", Ts1, 0),
                ("P", exp.Ps1, exp.Press_error),
            )

        exp.calc_COP()

        results_list.append(exp.COP["med"])

    # retornando valores originais
```

```
    exp.Hs1 = original_Hs1
    exp.Hs2 = original_Hs2
    exp.calc_COP()


    ax.plot(sub_res_list, results_list,linestyle=mark, color=col,␣
 ↪linewidth=2,label=legend)


ax.grid()

ax.legend()

plt.show()
```
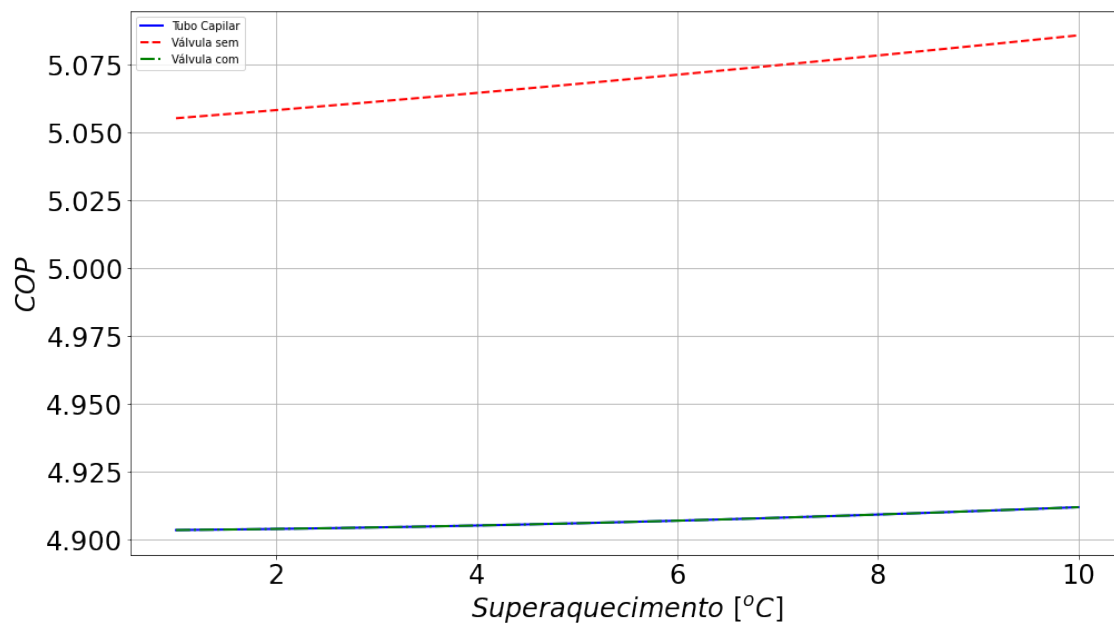
COP em função do superaquecimento