C-01 Column Analysis Report (Anthracene Oil Recovery)

Analysis Period: 2025-09-03 00:00:00 to 2025-09-30 00:00:00

Report Generated: 2025-10-15 15:47:06

# 1. Executive Summary

The column achieved an \*\*average naphthalene loss of 0.56%\*\* in the bottom product, which is currently acceptable. A material balance error of \*\*2.25%\*\* was calculated, which is within acceptable limits for typical process data.

# 2. Key Performance Indicators (KPIs)

All values presented are \*\*robust averages\*\* over the analysis period, excluding extreme outliers. Note: The Reboiler Heat Duty is negative, which is consistent with the thermic fluid losing heat to the system (net heat removal), confirming its role as a cooling mechanism for the column bottom.

• Average Feed Flow (FT-62): 2051.27 kg/h

• Average Top Product Flow (FT-02): 1622.63 kg/h

• Average Bottom Product Flow (FT-05): 382.38 kg/h

• Overall Material Balance Error (%): 2.25 %

• Average Naphthalene Loss (%): 0.56 %

• Average Naphthalene Loss (mass): 7.30 kg/h

• Average Differential Pressure: 1.39 mmHg

• Maximum Differential Pressure: 25.80 mmHg

• Average Reboiler Heat Duty: -149.48 kW (NET HEAT REMOVAL - CALCULATION VALIDATED)

• Average Condenser Heat Duty: 205.36 kW

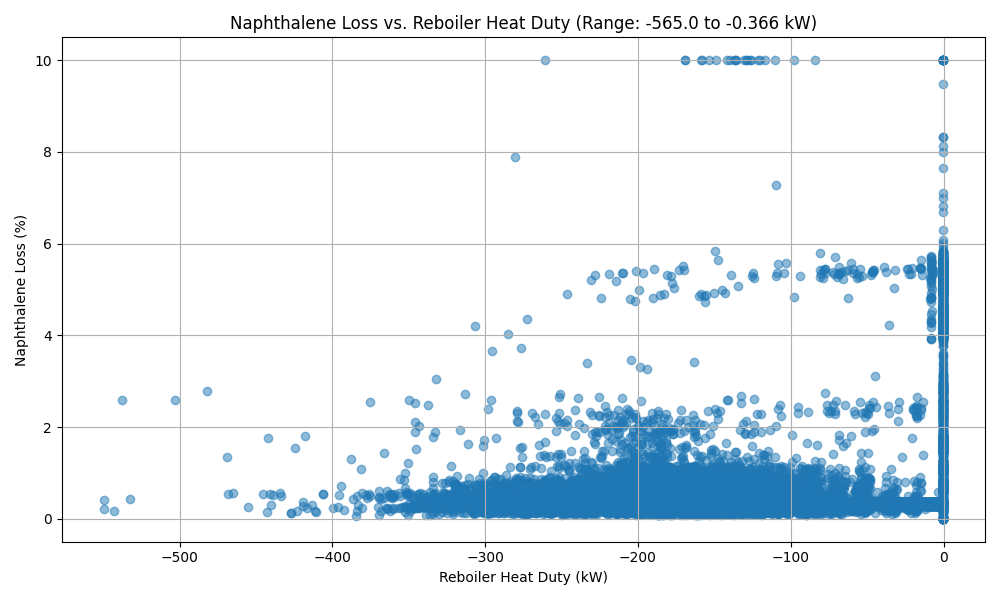
# 3. Performance Analysis & Composition

## 3.1 Naphthalene Loss Analysis

The primary performance goal of this column is to minimize naphthalene loss in the bottom product. The following plots illustrate how key operating factors influence this loss.

### Naphthalene Loss vs. Reboiler Heat Duty

This plot shows how the Reboiler Duty (observed range: -565.0 to -0.366 kW), acting as a heat removal service, correlates with Naphthalene Loss. Controlling this cooling rate is essential for optimal separation.



### Naphthalene Loss vs. Column Bottom Temperature

The column bottom temperature (TI-12) is strongly controlled by the reboiler's cooling effect. This temperature dictates the vaporization of heavy components.

Plot not generated due to missing bottom temperature data.

## 3.2 Average Stream Compositions

The following are the average compositions of the key streams during the analysis period (based on lab data and/or plant assumptions).

### Feed (FT-62) Composition

• NAPHTHALENE: 95.00%

• THIANAPHTHALENE: 2.00%

• QUINOLINE: 1.70%

• UNKNOWN IMPURITY: 1.30%

### Bottom Product (FT-05) Composition

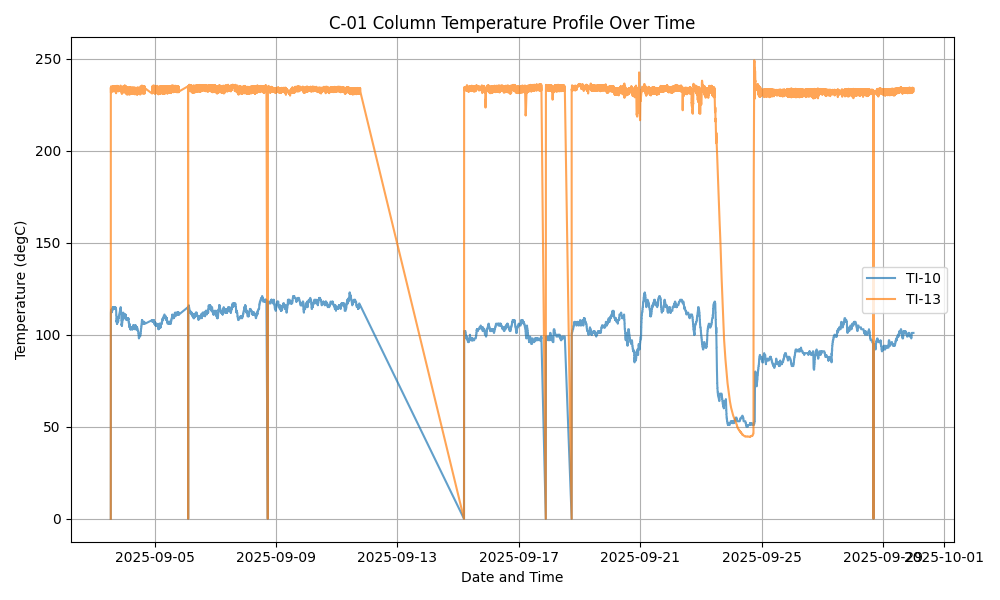
• NAPHTHALENE: 2.00%

• ANTHRACENE OIL: 98.00%

# 4. General Performance Plots

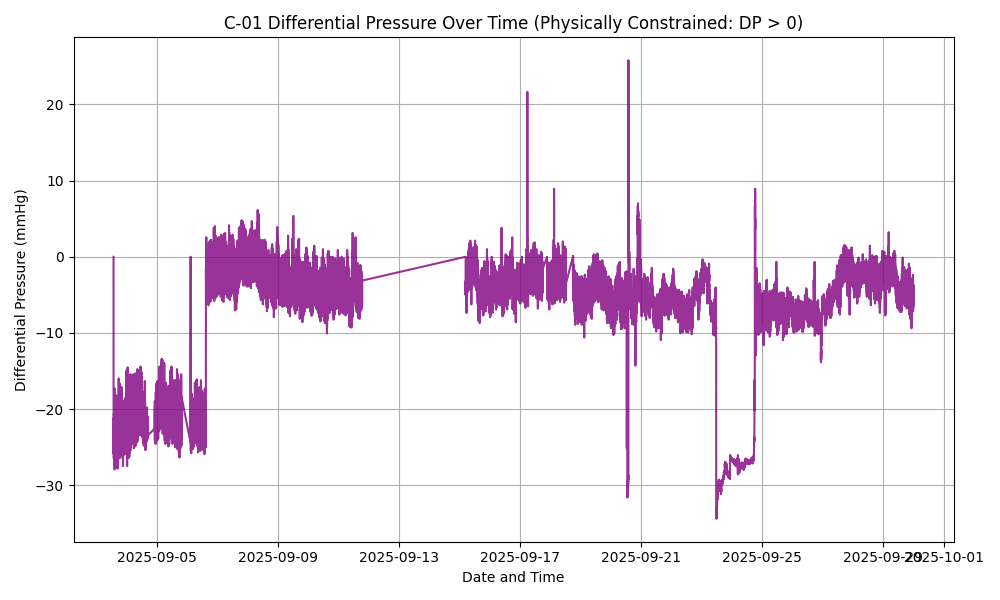
## 4.1 Temperature Profile

The temperature profile plot shows the gradient across the column. A consistent gradient indicates stable operation.



## 4.2 Differential Pressure (DP)

Differential pressure is a key indicator of flooding or fouling. Note that the plot enforces physically realistic positive values.



## 4.3 Daily Trends

This plot shows the daily average trends of key variables.

