

BAB V

NERACA PANAS

Kapasitas Produksi : 70.000 ton/tahun

Operasi Pabrik : 300 hari/tahun

Basis Perhitungan : 1 jam operasi

Satuan Panas : Kilo Joule (kJ)

Temperatur Referensi : 25°C

1. Heater-01 (H-01)

Komponen	Panas masuk (kJ)	Panas Keluar (kJ)
Q ₄	169.265,8711	-
Q ₅	-	2.361.530,8004
Q _{s, in}	3.156.250,8080	-
Q _{s, out}	-	963.985,8786
Total	3.325.516,6791	3.325.516,6791

2. Reaktor-01 (R-01)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Q ₅	2.361.530,8004	-
Q ₆	-	2.330.491,3630
Q _r	-	-6.510.749,4443
Q _{cw, in}	892.062,1202	-
Q _{cw, out}	-	7.433.851,0019
Total	3.253.592,9207	3.253.592,9207

3. Cooler-01 (C-01)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Q ₆	2.371.716,1794	-
Q ₇	-	1.387.978,5362
Q _{cw, in}	134.146,0423	-
Q _{cw, out}	-	1.117.883,6855
Total	2.505.862,2217	2.505.862,2217

4. Kolom Distilasi Output 1 (KD-01)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Panas Sensibel Masuk (Q _f)	352.422,3066	-
Panas Reboiler (Q _{rb})	40.343,7672	-
Panas Sensibel Distilat (Q _d)	-	314.426,3741
Panas Sensibel Bottom (Q _b)	-	77.596,4743
Panas Kondensor (Q _{cd})		743,2254
Total	392.766,0738	392.766,0738

5. Kolom Distilasi Output 2 (KD-01)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Panas Sensibel Masuk (Q _f)	2.040.137,1049	-
Panas Reboiler (Q _{rb})	10.055,9536	-
Panas Sensibel Distilat (Q _d)	-	1.976.708,6833
Panas Sensibel Bottom (Q _b)	-	73.484,3752
Total	1.757.308,3329	1.757.308,3329

6. Kolom Distilasi Output 3 (KD-01)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Panas Sensibel Masuk (Qf)	1.441.442,7821	-
Panas Reboiler (Qrb)	13.943,7369	-
Panas Sensibel Distilat (Qd)	-	1.381.898,9295
Panas Sensibel Bottom (Qb)	-	73.487,5896
Total	1.247.474,1592	1.247.474,1592

7. Kondensor-01 (CD-01)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Panas Feed (Qf)	314.494,6970	-
Panas Air Masuk	504.083.5789	-
Panas Laten Kondensasi	-	-3.421.115,3043
Panas Sensibel Distilat (Qd)	-	38.988,6172
Panas Sensibel Refluks (Qr)	-	8,4720
Panas Air Keluar	-	4.200.696,4910
Total	818.578.2759	818.578.2759

8. Reboiler-01 (RB-01)

Komponen	Panas masuk (kJ)	Panas Keluar (kJ)
Panas Feed (Qf)	3.369.416,9484	-
Panas Steam Masuk (Qs In)	58.083,7864	-
Panas Laten Penguapan (Qrb)	-	40.343,7672
Panas Sensibel Boil Up (Qv)	-	3.291.820,4741
Panas Bottom (Qb)	-	77.596,4743
Panas Steam Keluar (Qs Out)	-	17.740,0192
Total	3.427.500,7347	3.427.500,7347

9. Kolom Decanter-01 (DC-01)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Panas Masuk (Q_{14})	128.376,3677	-
Panas Keluar (Q_{15})	-	88.782,4031
Panas Keluar (Q_{17})	-	39.593,9647
Total	128.376,3677	128.376,3677

10. Cooler-02 (C-02)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Q_{13}	1.976.708,6833	-
$Q_{cw, in}$	252.045,3158	-
Q_{14}	-	128.376,3677
$Q_{cw, out}$	-	2.100.377,6314
Total	2.228.753,9991	2.228.753,9991

11. Cooler-03 (C-03)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Q_{19}	1.381.898,9295	-
$Q_{cw, in}$	176.334,0730	-
Q_{20}	-	88.782,3942
$Q_{cw, out}$	-	1.469.450,6083
Total	1.558.233,0025	1.558.233,0025

12. Cooler-04 (C-04)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Q_{23}	77.596,4743	-
$Q_{cw, in}$	10.037,8362	-
Q_{24}	-	3.985,6751
$Q_{cw, out}$	-	83.648,6354
Total	87.634,3105	87.634,3105

13. Heater-02 (H-02)

Komponen	Panas Masuk (kJ)	Panas Keluar (kJ)
Q ₁₅	88.7821,4031	-
Q ₁₆	-	1.372.698,0246
Q s, in	1.848.480,8398	-
Q s, out	-	564.565,2183
Total	1.937.263,2429	1.937.263,2429