**BAB V**

**NERACA PANAS**

Kapasitas Produksi : 70.000 Ton/Tahun

Operasi Pabrik : 300 Hari/Tahun

Basis : 1 Jam operasi

Satuan : Kilo Joule (kJ)

Temperatur Referensi : 25$℃$

1. ***Mixing tank* (M-01)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q2 | 202,9768 |  - |
| Q3 | 0,0333 | - |
| Q5 | - | 1864,8389 |
| Q*steam in* | 3417,2887 | - |
| Q*steam out* | - | 1755,4600 |
| **Total** | **3620,2988** | **3620,2988** |

1. ***Mixing tank* (M-02)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***Input* (Kj/Jam)** | ***Output* (Kj/Jam)** |
| Q4 | 0,1354 | - |
| Q5 | 1864,8389 | - |
| Q6 | - | 3588,4525 |
| Q*Steam in* | 3544,0612 | - |
| Q*Steam out* | - | 1820,5830 |
| **Total** | **5409,0354** | **5409,0354** |

1. ***Heater (H-01)***

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q7 *in* | 3577,2909 | - |
| Q7 *out*  | - | 9197,7853 |
| Qv | - | 5362,8143 |
| Q*steam in* | 22585,4419 | - |
| Q*steam out* | - | 11602,1332 |
| **Total** | **26162,7328** | **26162,7328** |

1. **Reaktor (R-01)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q9 | 15056,9969 |  - |
| Q10 |  - | 14256,3920 |
| QR |  - | -23277,1132 |
| Q *In* | -14440,8332 |  - |
| Q *Out* |  - | 9636,8848 |
| **Total** | **616,1637** | **616,1637** |

1. ***Cooler* (CO-01)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q10*in* | 14256,3920 |  - |
| Q10*out* |  - | 12523,2794 |
| QW*in* | -1039,4503 |  - |
| QW*out* |  - | 693,6624 |
| **Total** | **13216,9418** | **13216,9418** |

1. **Kolom Distilasi(KD-01)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q10 | 12523,2794 |  - |
| Q11 |  - | 4979,0851 |
| Q17 |  - | 8084,4207 |
| Q*steam in* | 1110,8904 |  - |
| Q*steam out* |  - | 570,6640 |
| **Total** | **13634,1698** | **13634,1698** |

1. ***Condensor* (CD-01)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q11 | 4979,0851 |  - |
| Q12 |  - | 20,5183 |
| Q13 |  - | 80,0718 |
| QW *in* | -7642,9987 |  - |
| Qw*out* |  - | 5100,4466 |
| Qv | 7864,9503 |  - |
| **Total** | **5201,0367** | **5201,0367** |

1. ***Reboiler* (RB-01)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q17 | 8084,4420 |  - |
| Q18 |  - | 0,0213 |
| Q19 |  - | 8084,4207 |
| Q*Steam in* | 0,0253 |  - |
| Q*Steam out* |  - | 0,0130 |
| Qv |  - | 0,0123 |
| **Total** | **8084,4673** | **8084,4673** |

1. ***Cooler* (CO-02)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q19 *in* | 8084,4207 |  - |
| Q19 *out* |  - | 121,6892 |
| QW *in* | -4775,7216 |  - |
| QW *out* |  - | 3187,0099 |
| **Total** | **3308,6991** | **3308,6991** |

1. ***Heater* (H-02)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q20 *in* | 123,5338 |  -  |
| Q20 *out* |  -  | 12592,7544 |
| Q*Steam in* | 26743,4729 |  -  |
| Q*Steam out* |  -  | 13738,1122 |
| Qv |  -  | 536,1400 |
| **Total** | **26867,0067** | **26867,0067** |

1. **Reaktor (R-02)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q21 | 18809,9605 |  - |
| Q22 |  - | 18317,0083 |
| Q Reaksi |  - | -8746,8557 |
| Q *In* | -5541,6599 |  - |
| Q *Out* |  - | 3698,1480 |
| **Total** | **13268,3005** | **13268,3005** |

1. ***Heat Exchanger* (HE-01)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (KJ/Jam)** |
| Q22 *in* | 18317,0083 |  - |
| Q22 *out* |  - | 16636,2712 |
| Q31 *in* | 3758,8700 |  - |
| Q31 *out* |  - | 5439,6069 |
| **Total** | **22075,8782** | **22075,8782** |

1. ***Cooler* (CO-03)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q22 | 16636,2712 | - |
| Q22 | - | 3719,4353 |
| QW *in* | -7746,9914 | - |
| QW *out* | - | 5169,8446 |
| **Total** | **8889,2799** | **8889,2799** |

1. **Kolom Destilasi (KD-02)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q22 | 3719,4353 | - |
| Q23 | - | 1755,4099 |
| Q29 | - | 3781,4780 |
| Q*steam in* | 3737,3046 | - |
| Q *Steam out* | - | 1919,8520 |
| **Total** | **7456,7398** | **7456,7398** |

1. ***Condensor* (CD-02)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q23 | 1755,4099 | - |
| Q24 | - | 17,3408 |
| Q25 | - | 82,2322 |
| QW *in* | -1765,6566 | - |
| QW *out* | - | 1178,2858 |
| Qv | 1288,1055 | - |
| **Total** | **1277,8588** | **1277,8588** |

1. ***Reboiler* (RB-02)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q29 | 3781,4950 | - |
| Q30 | - | 0,0170 |
| Q31 | - | 3781,4780 |
| QS *in* | 0,0336 | - |
| QS *out* | - | 0,0173 |
| Qv | - | 0,0164 |
| **Total** | **3781,5286** | **3781,5286** |

1. **Kolom Distilasi (KD-03)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q31 | 5439,6069 | - |
| Q32 | - | 4711,9841 |
| Q37 | - | 1002,9896 |
| Q*steam in* | 566,2482 | - |
| Q*steam out* | - | 290,8815 |
| **Total** | **6005,8552** | **6005,8552** |

1. ***Condensor* (CD-01)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q32 | 4711,9841 | - |
| Q33 | - | 87,7401 |
| QW *in* | -4876,9772 | - |
| QW *out* | - | 3254,5814 |
| Qv | 3507,3147 | - |
| **Total** | **3342,3216** | **3342,3216** |

1. ***Reboiler* (RB-03)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q37 | 1003,0564 | - |
| Q38 | - | 0,0668 |
| Q39 | - | 1002,9896 |
| Qs *In* | 0,0603 | - |
| Qs *Out* | - | 0,0310 |
| Qvav | - | 0,0293 |
| **Total** | **1003,1167** | **1003,1167** |

1. ***Cooler* (C-04)**

|  |  |  |
| --- | --- | --- |
| **Komponen** | ***In*put (Kj/Jam)** | ***Out*put (Kj/Jam)** |
| Q39 *in* | 1002,9896 | - |
| Q39 *out* | - | 11,8724 |
| QW*in* | -594,4317 | - |
| QW*out* | - | 396,6855 |
| **Total** | **408,5579** | **408,5579** |