



**BAB IV  
 NERACA PANAS**

**1. REAKTOR I(R-210)**

NERACA ENERGI			
Komponen	Masuk (kkal/Jam)	Komponen	Keluar (Kkal/jam)
1.Feed Masuk		1.Produk Reaksi	
MgSo4	61,25093333	Mg(OH)2	29,92454991
MgCl2	33,06158333	2NaCl	52,29246309
CaSO4.2H2O	15,03432	Ca(OH)2	3,127157192
NaCl	26892,6399	Na2SO4	4,755423947
H2O	3379555,048	NaOH	15,679951
TOTAL	3406557,035	TOTAL	105,7795451
NaOH	37,98752747	2.sisa bahan baku	
H2O	89,46337990	MgCl2	3,375761667
TOTAL	127,45090737	CaSO4	8,268876
		TOTAL	11,64463767
		3.komponen tidak bereaksi	
		MgSo4	61,25093333
		NaCl	26892,6399
		H2O	3379555,048
		Total	3406708,144
		Qserap	
		259542,91627	
		2.ΔH Reaksi	
		-16124,18067	
TOTAL	3650244,304	TOTAL	3650244,304



2. REAKTOR II (R-220)

NERACA ENERGI			
Komponen	Masuk (kkal/Jam)	Komponen	Keluar (Kkal/jam)
1.Feed Masuk		1.Produk Reaksi	
Mg(OH) <sub>2</sub>	29,92454991	CaCO <sub>3</sub>	2,806388674
2NaCl	52,29246309	Na <sub>2</sub> SO <sub>4</sub>	4,649747859
Ca(OH) <sub>2</sub>	3,127157192	MgCO <sub>3</sub> ↓	6,022629273
Na <sub>2</sub> SO <sub>4</sub>	4,755423947	2 NaCl	4,648218942
NaOH	15,679951		
TOTAL	105,7795451		
		TOTAL	18,12698475
2.sisa bahan baku		2.sisa bahan baku	
MgCl <sub>2</sub>	3,375761667	CaSO <sub>4</sub>	1,6537752
CaSO <sub>4</sub>	8,268876	MgCl <sub>2</sub>	0,675152333
TOTAL	11,64463767		
		TOTAL	2,328927533
3.komponen tidak bereaksi		3.komponen tidak bereaksi	
MgSo <sub>4</sub>	61,25093333	MgSo <sub>4</sub>	61,25093333
NaCl	26892,6399	NaCl	27091,84464
H <sub>2</sub> O	3379555,048	H <sub>2</sub> O	3379555,048
Total	3406708,144	Total	3406708,144
	Qserap		Qserap
	259542,9163		280812,04014
	2.ΔH Reaksi		2.ΔH Reaksi
	-16124,18067		-26954,59074
TOTAL	3650244,304	TOTAL	3650244,30369



### 3 .EVAPORATOR I (V-260A)

#### Neraca Masuk

KOMPONEN	Massa (kg/hari)	Cp (kkal/ kg.°C )	$\Delta T$ (°C)	Q (kkal)
Ca(OH) <sub>2</sub>	1,510	0,289	7	3,054
CaSO <sub>4</sub> .2H <sub>2</sub> O	0,858	0,272	7	1,633
H <sub>2</sub> O	476878,15 4	1	7	3338147,076
MgSO <sub>4</sub>	38,978	0,222	7	60,572
MgCl <sub>2</sub>	0,4872233 33	0,193	7	0,658
NaCl	13973,477	0,206	7	20149,754
NaOH	4,772	0,46	7	15,366
<b>total</b>	<b>490898,23 5</b>		<b>Total</b>	<b>3358378,113</b>
Steam (S)	488860,12 6	$\lambda_{s1}$ (kkal/Kg)		247394770,8 12
<b>Total</b>	<b>488860,12 6</b>		506,0645315	<b>247394770,8 12</b>
<b>TOTAL</b>				<b>250753148,9 25</b>



**Neraca  
 Keluar**

KOMPONEN	Massa (kg/hari)	Cp (kkal/ kg. °C )	ΔT (°C)	Q (kkal)
Ca(OH) <sub>2</sub>	1,5096620 93	0,289	103,31777 59	45,077
CaSO <sub>4</sub> .2H <sub>2</sub> O	0,8575130 67	0,272	103,31777 59	24,098
H <sub>2</sub> O	320906,65 54	1	103,31777 59	33155361,89 6
MgSO <sub>4</sub>	38,977866 67	0,222	103,31777 59	894,018
MgCl <sub>2</sub>	0,4872233 33	0,193	103,31777 59	9,715
NaCl	13973,477 12	0,206	103,31777 59	297403,967
NaOH	4,772159	0,46	103,31777 59	226,802
<b>total</b>	<b>334926,73</b> <b>7</b>	Total		33453965,57 3
Uap H <sub>2</sub> O	334926,73 7	H <sub>1</sub> (kkal/Kg)		217584342,5 48
JUMLAH	334926,73 7	649,648		
<b>TOTAL</b>				250753148,9 25



#### 4 . EVAPORATOR II (V-260B)

##### Neraca Masuk

KOMPONEN	Massa (kg/hari)	Cp (kkal/ kg.°C)	$\Delta T$ (°C)	Q (kkal)
Ca(OH) <sub>2</sub>	1,5096620 93	0,289	103,31777 59	45,077
CaSO <sub>4</sub> .2H <sub>2</sub> O	0,8575130 67	0,272	103,31777 59	24,098
H <sub>2</sub> O	320906,65 54	1	103,31777 59	33155361,896
MgSO <sub>4</sub>	38,977866 67	0,222	103,31777 59	894,018
MgCl <sub>2</sub>	0,4872233 33	0,193	103,31777 59	9,715
NaCl	13973,477 12	0,206	103,31777 59	297403,967
NaOH	4,772159 7	0,46	103,31777 59	226,802
total	334926,73 7			33453965,573
Steam (S)	334926,73 7	$\lambda s_2$ (kkal/kg)		174473732,083
JUMLAH	334926,73 7	520,931		
TOTAL				207927697,655



Pra Rencana Pabrik Kimia  
Pabrik garam industry sodium chloride dari air laut  
dengan proses presipitasi dan evaporasi

BAB IV Neraca Panas

Neraca  
Keluar

KOMPONEN	Massa (kg/hari)	Cp (kkal/ kg.°C)	$\Delta T$ (°C)	Q (kkal)
Ca(OH) <sub>2</sub>	1,5096620 93	0,289	66,878	29,179
CaSO <sub>4</sub> .2H <sub>2</sub> O	0,8575130 67	0,272	66,878	15,599
H <sub>2</sub> O	164935,15 71	1	66,878	11030599,594
MgSO <sub>4</sub>	38,977866 67	0,222	66,878	578,705
MgCl <sub>2</sub>	0,4872233 33	0,193	66,878	6,289
NaCl	13973,477 12	0,206	66,878	192511,904
NaOH	4,772159	0,46	66,878	146,811
total	178955,23 86			11223888,081
Uap H <sub>2</sub> O	309050,09 2		H <sub>2</sub> (kkal/Kg)	196703809,575
JUMLAH	309050,09 19		636,479	
TOTAL				207927697,655



### 5 .EVAPORATOR III (V-260C)

#### Neraca Masuk

KOMPONEN	Massa (kg/hari)	Cp (kkal/ kg. °C)	$\Delta T$ (°C)	Q (kkal)
Ca(OH) <sub>2</sub>	1,5096620 93	0,289	66,878401 13	29,17853445
CaSO <sub>4</sub> .2H <sub>2</sub> O	0,8575130 67	0,272	66,878401 13	15,59895598
H <sub>2</sub> O	164935,15 71	1	66,878401 13	11030599,59
MgSO <sub>4</sub>	38,977866 67	0,222	66,878401 13	578,7045833
MgCl <sub>2</sub>	0,4872233 33	0,193	66,878401 13	6,288850483
NaCl	13973,477 12	0,206	66,878401 13	192511,9044
NaOH	4,772159	0,46	66,878401 13	146,8110074
total	178955,23 86			11223888,08
Uap H <sub>2</sub> O		$\lambda_{s3}$ (kkal/kg)		168359174,034
JUMLAH	309050,09 2	544,763		
TOTAL				179583062,115



**Neraca  
 Keluar**

KOMPONEN	Massa (kg/hari)	Cp (kkal/ kg. °C)	ΔT (°C)	Q (kkal)
Ca(OH) <sub>2</sub>	1,5096620 93	0,289	38,460	16,780
CaSO <sub>4</sub> .2H <sub>2</sub> O	0,8575130 67	0,272	38,460	8,970547092
H <sub>2</sub> O	8963,6586 91	1	38,460	344742,3132
MgSO <sub>4</sub>	38,977866 67	0,222	38,460	332,7977029
MgCl <sub>2</sub>	0,4872233 33	0,193	38,460	3,616551614
NaCl	13973,477 12	0,206	38,460	110708,5056
NaOH	4,772159	0,46	38,460	84,42712816
total	22983,740 23			455897,4105
Uap H <sub>2</sub> O		H <sub>3</sub> (kkal/kg)		179127164,705
JUMLAH	286490,93 51	625,245		
TOTAL				179583062,115





**6. BAROMETIC CONDENSOR (E-262)**

Masuk		Keluar	
Komponen	Entalpi (kkal)	Komponen	Entalpi (kkal)
H <sub>2</sub> O(uap air)	164951739,7	H <sub>2</sub> O (kondensat)	156291691,7
		Q serap	8660047,985
<b>TOTAL</b>	<b>164951739,7</b>	<b>TOTAL</b>	<b>164951739,7</b>



7. CRYSTALIZER (X-270)

NERACA ENERGI			
Komponen	Masuk (kkal/Jam)	Komponen	Keluar (Kkal/jam)
Komponen	Entalpi(kkal)	Komponen	Entalpi(kkal)
Ca(OH) <sub>2</sub>	15,27023207	Ca(OH) <sub>2</sub>	3,054046414
CaSO <sub>4</sub> .2H <sub>2</sub> O	14,37198312	CaSO <sub>4</sub> .2H <sub>2</sub> O	1,632704879
H <sub>2</sub> O	52,83817325	H <sub>2</sub> O	424,7615637
MgSO <sub>4</sub>	11,73007446	MgSO <sub>4</sub>	60,5716048
MgCl <sub>2</sub>	10,19776744	MgCl <sub>2</sub>	0,658238723
NaCl	10,88466369	NaCl	403,511187
NaOH	24,30555969	NaOH	15,36635198
NaCl.2H <sub>2</sub> O(s)	26,30642007	NaCl.2H <sub>2</sub> O	33243,34977
total	165,9048738	total	34152,90547
Qcrystalization	434963,3577	Qserap	400976,3571
<b>TOTAL</b>	<b>435129,2625</b>	<b>TOTAL</b>	<b>435129,2625</b>



**8 . ROTARY DRYER (B-290)**

NERACA ENERGI			
Masuk (kkal/Jam)		Keluar (Kkal/jam)	
Qbahan	40608,064 86	Qbahan	47886,34737
Qudara	46833673, 74	Qudara Qloss	44476560,68 2349834,78
<b>TOTAL</b>	<b>46874281, 81</b>	<b>TOTAL</b>	<b>46874281,81</b>

**9 . HEATER (E-293)**

NERACA ENERGI			
Masuk (kkal/Jam)	Entalpi(kkal)	Keluar (Kkal/jam)	Entalpi(kkal)
Udara bebas		Udara panas ke rotary dryer	
udara	3057277,764	udara	46833673,74
Qsupply	46079397,98	Qloss	2303002,00
<b>TOTAL</b>	<b>49136675,74</b>	<b>TOTAL</b>	<b>49136675,74</b>