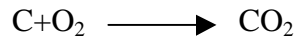
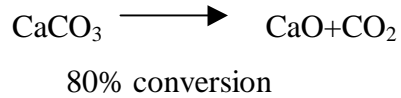


Material Balance

Production of 750 Tons/day (31250 kg/hr) of Soda ash

Material balance around Lime Kiln



90% conversion

Excess air is not used

Inputs:

Calcium carbonate = 36851.4125 kg/hr

Carbon = 2812.5 kg/hr

Oxygen = 7500 kg/hr

Nitrogen = 24687.5 kg/hr

Total input = 71851.4125 kg/hr

Out puts:

Carbon di oxide = 22252.9472 kg/hr

Calcium oxide = 16509.4328 kg/hr

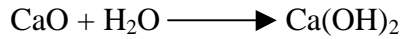
Nitrogen gas = 24687.5 kg/hr

Carbon (unreacted) = 1031.25 kg/hr

Calcium carbonate (unreacted) = 7370.282 kg/hr

Total output = 71851.412 kg/hr

Material balance around Slaker



200% Excess water used

Inputs:

Calcium oxide = 16509.4328 kg/hr

Water = 10613.2068 kg/hr

Total input = 27122.6396 kg/hr

Out puts:

Calcium hydroxide = 21816.0362 kg/hr

Water = 5306.6034 kg/hr

Total out put = 27122.6396 kg/hr

Material balance around ammonia absorber

Assuming 99% absorption of input ammonia

Inputs:

Sodium chloride = 45990.5625 kg/hr

Water = 136693.1508 kg/hr

Ammonia = 18376.95 kg/hr

Inerts = 18345.59 kg/hr

Total input = 219406.25 kg/hr

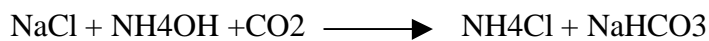
Outputs:

Sodium chloride = 45990.5625 kg/hr
Water = 117429.7832 kg/hr

Inerts = 18345.59 kg/hr
Ammonia(with inerts) = 183.7695 kg/hr
Ammonium hydroxide = 37456.548 kg/hr

Total output = 219406.22 kg/hr

Material balance around Carbonating Tower



Conversion 75%

Inputs:

Sodium chloride = 45990.5628 kg/hr
Carbon di oxide = 34591.1896 kg/hr
Ammonium hydroxide = 37456.548 kg/h
Water = 117429.7832 kg/hr

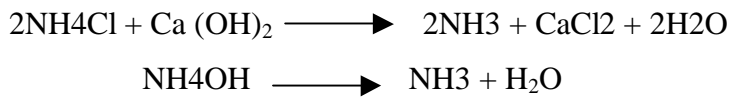
Total input = 235468.0836 kg/hr

Outputs:

Ammonium chloride = 31544.8091 kg/hr
Sodium bi carbonate = 49528.3019 kg/hr
Sodium chloride (unreacted) = 11497.6397 kg/hr
Ammonia hydroxide (unreacted) = 16819.754 kg/hr

Carbon di oxide (unreacted)	= 8647.7974 kg/hr
Water	= 117429.7832 kg/hr
Total output	= 235468.0853 kg/hr

Material balance around Ammonia distiller



Inputs:

Calcium hydroxide	= 21816.0362 kg/hr
Ammonium chloride	= 31544.8091 kg/hr
Ammonia hydroxide	= 16819.754 kg/hr
Water	= 122736.3866 kg/hr
Sodium chloride (unreacted)	= 11497.6397 kg/hr

Total input = 204414.6251 kg/hr

Outputs:

Ammonia	= 18193.179 kg/hr
Calcium chloride	= 32724.0543 kg/hr
Water	= 141999.7521 kg/hr
Sodium chloride (unreacted)	= 11497.6397 kg/hr

Total output = 204414.6251 kg/hr

Material balance around calciner



Complete decomposition

Inputs:

Sodium bi carbonate = 49528.3019 kg/hr

Outputs:

Sodium carbonate = 31250 kg/hr

Carbon di oxide = 12971.6972 kg/hr

Water = 5306.6034 kg/hr

Total output = 49528.3019 kg/hr