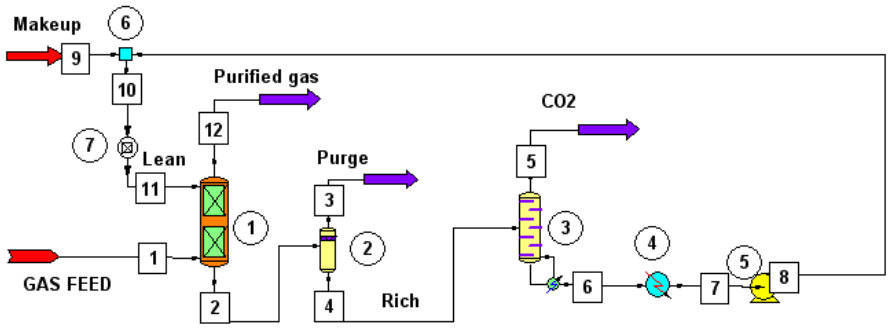
CO_2 Removal by the Benfield Process



Stream No.	1	12	3	5
Name	GAS FEED	Purified gas	Purge	CO2
- - Overall - -				
Temp C	33.00	83.70	86.35	93.70
Pres bar	22.20	21.50	1.50	1.30
Actual vol m3/h	1888.10	2197.04	129.59	7192.02
Std vap 0 C m3/h	38668.52	36527.91	146.49	6925.31
Component mole fractions				
Ethylene	0.1959	0.2060	0.3009	0.0007
Oxygen	0.0453	0.0479	0.0166	0.0000
Carbon Dioxide	0.0682	0.0000	0.0503	0.3792
Water	0.0006	0.0170	0.2709	0.6198
Nitrogen	0.0248	0.0263	0.0054	0.0000
Argon	0.0609	0.0643	0.0394	0.0000
Methane	0.6008	0.6347	0.3151	0.0002
Ethane	0.0036	0.0038	0.0016	0.0000

Stream No.	11	4
Name	Lean	Rich
- - Overall - -		
Molar flow kmol/hr	6923.38	6895.29
Mass flow kg/hr	163428.52	168078.61
Temp C	83.49	86.35
Pres bar	28.50	1.50
- - Liquid only - -		
PH value	11.19	10.03
Flowrates in kmol/hr		
Carbon Dioxide	0.01	0.16
Water	5550.93	5407.38
K Carbonate	0.00	0.00
H+	0.00	0.00
OH-	2.32	0.30
CO3--	432.08	317.09
HCO3-	35.78	267.78
K+	902.26	902.26

DESCRIPTION:

What you can see in the picture above is the simulation of an existing plant to remove CO2 from a process stream by absorption/regeneration with a hot potassium carbonate solution. CO2 is absorbed by chemical reaction, and it is the type of calculations CHEMCAD 5 Electrolyte Package has been made for.

This sort of simulation requires applying the True Species Approach, where regular components and electrolyte species are treated equally.

CHEMCAD 5 has a database of ionic reactions built-in. Many industrially important systems have been covered. In case some reaction data are missing, CHEMCAD 5 would try to calculate equilibrium coefficients. Electrolyte Regression facility is also available.