1st Post Combustion Capture Conference

Study on the Activity of New Amine Based Absorbents CO_2 Absorption

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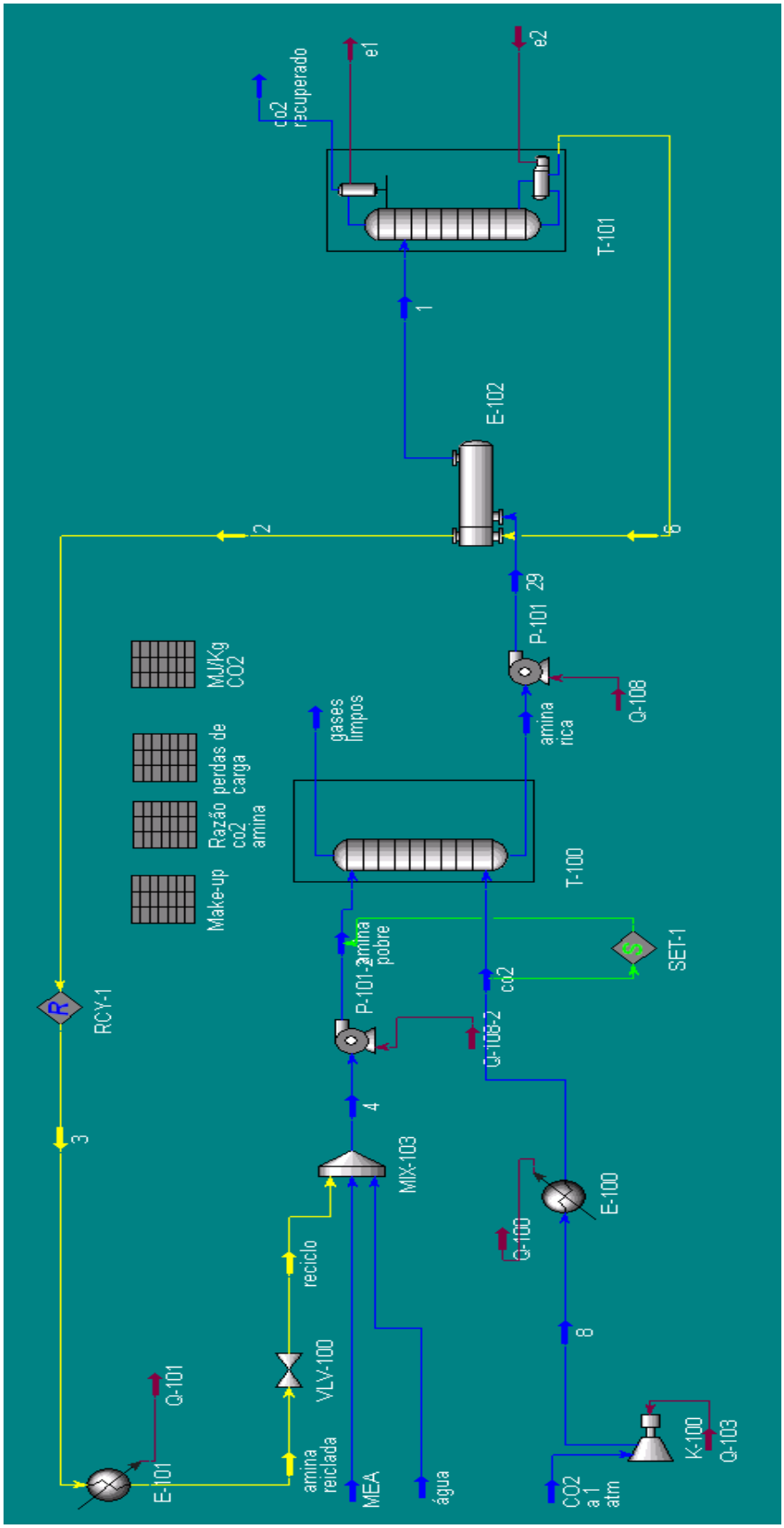
Keywords: CO_2 sequestration ; amines ; gas absorption

Abstract

The capture of CO_2 from flue gases can be done by chemical absorption with aqueous amine solutions like MEA (monoethanolamine). Although this is a proven process, there are still operational problems to overcome, namely those resulting from solvent degradation, precipitation, corrosion and foaming. Also, the absorption capacity of the most current amines must be improved in order to obtain a more profitable operation. It has been shown previously that relationships exist between the amine structure and the activity/capacity for CO_2 absorption. The introduction of amine substituents at the α-carbon creates a carbamate instability, which causes the hydrolysis to go faster, thus increasing the amount of bicarbonate, allowing for higher CO_2 loadings. In order to obtain a better understanding of the structure-activity relationship, laboratory studies have been made comprising solvent screening experiments investigating the effect of variables such as chain length, increase in number of functional groups, side chain at α-carbon position, alkyl group position in cyclic amine and side effect of cyclic amine with different functional groups. The description of these effects, in a quantitative way, on the initial rate of absorption for CO_2, as well as the capacity of various solvents for CO_2 absorption is also supported by simulation using ASPEN/HYSYS and it is believed to benefit on the design of more efficient absorption systems for CO_2 capture from flue gases. This paper describes the first step of this study, which is the computer simulation of the operation in order to chose the optimal operating conditions for the pilot plant.


co2 recuperado
e1
e2
T-101
1
E-102
2
6
P-101
29
MJ/Kg CO2
perdas de carga
Razão co2 amina
Make-up
gases limpos
amina rica
Q-108
T-100
P-101-amina pobre
co2
SET-1
RCY-1
Q-108-2
3
4
MIX-103
E-100
Q-100
reciclo
VLV-100
Q-101
E-101
amina reciclada
MEA
água
8
K-100
Q-103
CO2 a 1 atm