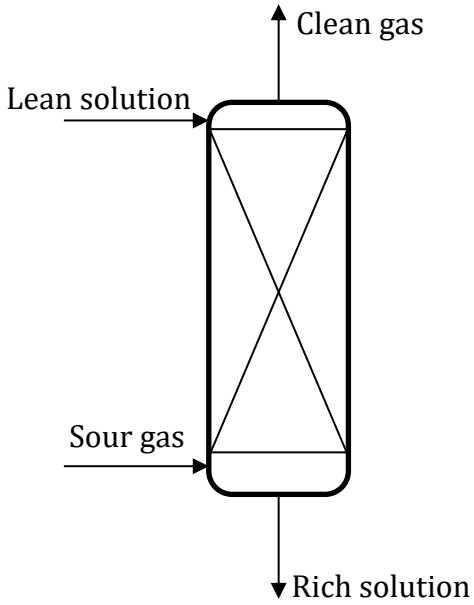
Separation Process Technology I

Aspen Tutorial 1: Absorption of H_2S with the Rectisol process

In this tutorial, we want to use a commercial software platform to perform the removal of hydrogen sulfide from a sour gas.

Let us consider the following configuration:



Where the entering sour gas is specified as follow:

- Composition, [mole frac.]
  CO_2 0.0302
  H_2S 0.0019
  CO 0.5886
  N_2 0.0977
  H_2 0.2722
  AR 0.0094
- Pressure: 40 bar
- Flow rate: 50 kg/s
- Temperature: -10°C

The chosen process for H_2S removal is the Rectisol Process.

It is required to:

I. Develop an equilibrium-based Aspen simulation for the considered process and:
   a. Identify the L/G that leads to the specification $H_2S_{cleangas}$ = 0.1ppm.
   b. Investigate the effects of the temperature in the lean solution when the specification $H_2S_{cleangas}$ = 0.1ppm is kept constant
II. Develop a rate-based Aspen simulation and:
   a. Investigate how the packing height and the L/G affect the system and identify the design conditions for which the specification $H_2S_{cleangas}$ = 0.1ppm is guaranteed.

Assumptions for the simulations:

Property method: PC-SAFT (Perturbated Chain Statistical Association Fluid Theory)
5 equilibrium stages
Temperature range for task I.b: T_{min} = -60 °C T_{max}= -20 °C

Packing type for task II:
Type: INTX
Vendor: generic
Material: ceramic
Dimension: 50mm
Fractional approach to maximum capacity: 0.6