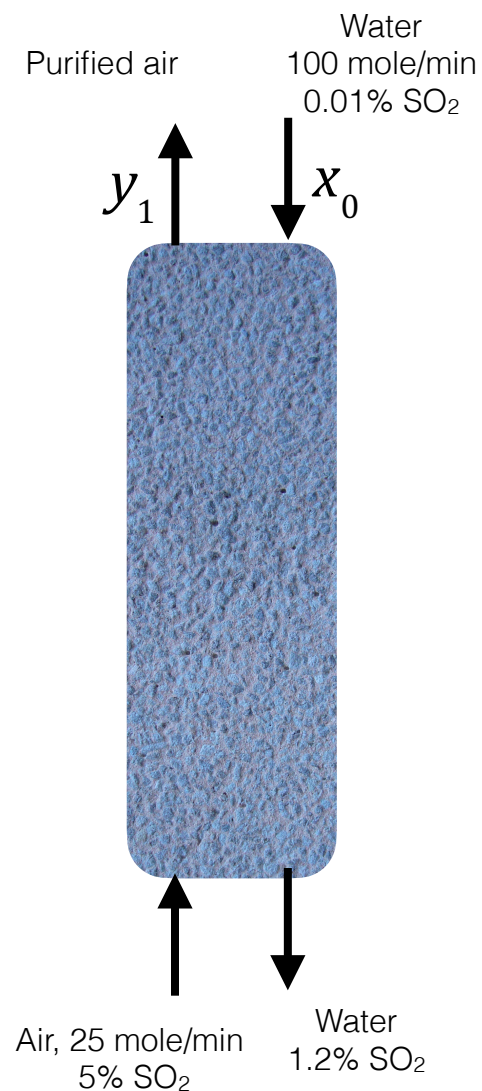# Exercise problem 1: Calculate NTU, and $K_y a$ for the case of concentrated absorption.

SO_2 is absorbed from air with water at 20.0°C in a 0.7 meter tall packed column absorber with a cross-sectional area of 1 m². The inlet water contains 0.01% SO_2. The outlet water contains 1.2 mol% SO_2. The concentration of SO_2 in inlet air is 5%. The total liquid inlet flow rate is 100 mole/minute. The total gas inlet flow rate is 25 mole/minute. Equilibrium relationship is given below. Calculate the concentration of SO_2 in the exit air stream, NTU, and $K_y a$.

$$y^*_{N+1} = 3x_N \qquad y^*_1 = 10x_0$$

$$h = \left(\frac{G_C}{K_y aA} \right) \frac{y_{N+1} - y_1}{(y - y^*)_{N+1} - (y - y^*)_1} \ln \left[\frac{(y - y^*)_{N+1}}{(y - y^*)_1} \right]$$

Purified air

Water
100 mole/min
0.01% SO_2

y_1 $\qquad$ x_0

Air, 25 mole/min
5% SO_2

Water
1.2% SO_2

EPFL

Exercise problem 2

For the separation of 10% CO_2 from N_2, will you use physisorbent or chemisorbent.

Exercise problem 3

For the separation of 10 ppm toxic chemical (e.g. phosgene) in air, will you use physisorbent or chemisorbent.