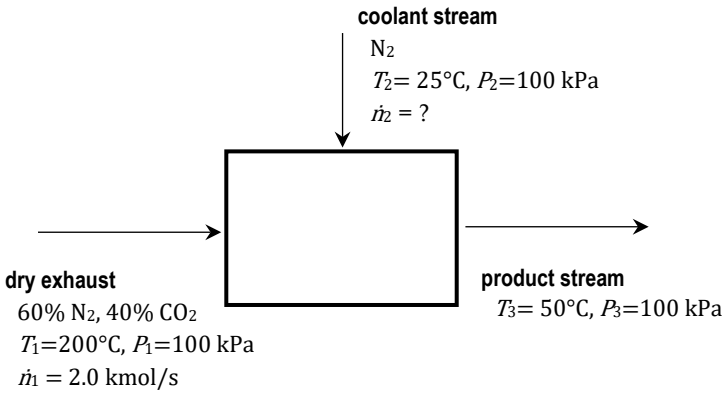
EXAMPLE: I'm exhausted, so I'm going to cool it

A flow of $\dot{n}_1$=2.0 kmol/s of a dry exhaust at T_1=200°C and P_1=100 kPa mixes with a stream of pure nitrogen at T_2=25°C and P_2=100 kPa in an adiabatic mixing chamber. The molar composition of the dry exhast is 60% nitrogen and 40% carbon dioxide. If the product stream exits the chamber at T_3=50°C and P_3=100 kPa, determine



(a) the molar flow rate of the coolant N_2 stream, $\dot{n}_2$, in kmol/s and
(b) the rate of entropy generation inside the mixing chamber, in kW/K.

Assume all gases behave as ideal gases with variable specific heats.