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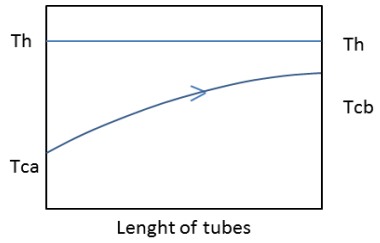
6. Energy balances in heat exchangers

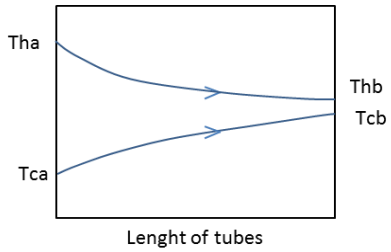
a) **Hot fluid:** condensing vapour (enters condenser as saturated vapour and the condensate leaves at condensing temperature (T_h) without any further cooled)
Cold fluid: cooling water
Countercurrent flow heat exchanger

$$q = m\,\lambda = m_c\,C_{pc}\,(T_{ca}-T_{cb})$$



b) **Hot fluid:** aniline
Cold fluid: toluene
Parallel flow heat exchanger

$$q = m_c\,C_{pc}\,(T_{ca}-T_{cb}) = m_h\,C_{ph}\,(T_{ha}-T_{hb})$$



c) **Hot fluid:** superheated vapor
Cold fluid: cooling water
Countercurrent flow heat exchanger

$$q = m\,\lambda + m_h\,C_{ph}\,(T_{ha}-T_h) = m_c\,C_{pc}\,(T_{ca}-T_{cb})$$