



Steam separator 2

Consider a liquid – steam separator, which is a big vessel where a saturated mixture enters that is separated into a saturated vapor and a saturated liquid. The saturated mixture enters the liquid – steam separator at a mass flow rate of 260 kg/s. The saturated vapor leaves the liquid – steam separator at a mass flow rate of 190 kg/s.

What is the mass flow rate of the saturated liquid leaving the liquid – steam separator?

Answer: 70 kg/s

Explanation: Conservation of mass requires the incoming mass flow rate to be equal to the outgoing mass flow rates: $\dot{m}_{mix} = \dot{m}_{sat.vapor} + \dot{m}_{sat.liquid} \rightarrow \dot{m}_{sat.liquid} = \dot{m}_{mix} - \dot{m}_{sat.vapor} = 260 - 190 = 70 \text{ kg/s}$