Why does steam condense to liquid water even though this entropy change is unfavorable?

Solution.

The favourable direction of the process determined by change in Gibbs free energy(ΔG):

$$\Delta G = \Delta H - T\Delta S;$$

Where

ΔH – enthalpy change;

ΔS - entropy change;

T – temperature;

If $\Delta G < 0$ process is spontaneous.

The enthalpy in this process decreases. So enthalpy change $\Delta H < 0$.

In this process $\Delta G < 0$ due to enthalpy change $\Delta H < 0$, despite entropy change is unfavorable.

Answer: steam condense to liquid water even though this entropy change is unfavorable due to enthalpy change $\Delta H < 0$, and Gibbs free energy change also $\Delta G < 0$.