

Answer on Question #82930, Physics / Molecular Physics | Thermodynamics

Question. The volume of 1 *kg* of water at 100°C is 10^{-3} m^3 and the volume of 1 *kg* of steam at normal pressure is 1.671 m^3 latent heat of steam is $2.3 \cdot 10^6 \text{ joule per kg}$ and the normal pressure is 10^5 N/m^2 How much work will be done in converting 5 *kg* of water at hundred degree Celsius into steam at the same pressure and temperature.

Solution.

The work done is equal

$$W = \int_{V_i}^{V_f} p dV = p(V_f - V_i) = 10^5 \cdot (5 \cdot 1.671 - 5 \cdot 10^{-3}) = 8.35 \cdot 10^5 \text{ J}.$$

Answer. $W = 8.35 \cdot 10^5 \text{ J}$.

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