

EXAMPLE: At one atmospheric pressure, 1 g of water has a volume 1 cm^3 in liquid phase and 1671 cm^3 in vapour phase. Find the work done in this process. (Given, $1 \text{ atm} = 1.013 \times 10^5 \text{ Pa}$)

Vapourisation

$$\Delta W = p \cdot \Delta V$$

$$p = 1 \text{ atm} = 1.013 \times 10^5 \text{ Pa}$$

$$V_1 = 1 \text{ cm}^3 = 1 \times 10^{-6} \text{ m}^3$$

$$V_2 = 1671 \text{ cm}^3 = 1671 \times 10^{-6} \text{ m}^3$$

$$\Delta V = V_2 - V_1 = (1671 \times 10^{-6} - 1 \times 10^{-6}) \text{ m}^3 = 1670 \times 10^{-6} \text{ m}^3$$

$$\Delta W = 1.013 \times 10^5 \times 1670 \times 10^{-6} \text{ J}$$

$$= 169.171 \text{ J} \approx 169 \text{ J}$$

$\because V_f > V_i \Rightarrow \text{expansion} \Rightarrow \Delta W = +\text{ive}$
 $\Rightarrow \text{work is done by the system.}$