

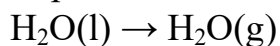
JEE previous year questions:

Chemical Thermodynamics-IV

1. For water $\Delta_{\text{vap}} H = 41 \text{ kJ mol}^{-1}$ at 373 K and 1 bar pressure. Assuming that water vapour is an ideal gas that occupies a much larger volume than liquid water, the internal energy change during evaporation of water is _____ kJ mol^{-1} [Use: $R = 8.3 \text{ J mol}^{-1} \text{ K}^{-1}$] (JEE Mains, 2021)

Ans: 38

Explanation:



$$\Delta H = 41 \text{ kJ/mol (given)}$$

$$\text{We know, } \Delta H = \Delta U + \Delta n_g RT = 41 \text{ kJ/mol} = \Delta U + 1 \times (8.3/1000) \times 373$$

$$\text{(As, } R = (8.3/1000) \text{ kJ mol}^{-1} \text{ K}^{-1}\text{)}$$

$$\Delta U = 41 - 3.0959 = 38 \text{ kJ/mol}$$