

Problem-Solving Example 12

What is the ionization energy of hydrogen in kJ mol^{-1} ?

Solution



Example 12 : Solution :

For ionization process : $n_x = 1$; $n_y = \infty$

Using Ryberg Equation (2nd form)

$$\Delta E = (2.18 \times 10^{-18} \text{ J}) \left[\frac{1}{n_x^2} - \frac{1}{n_y^2} \right]$$

J_{photon}^{-1} \nearrow

$$= (2.18 \times 10^{-18} \text{ J}) \left(\frac{1}{1^2} - \frac{1}{\infty^2} \right)$$

$$\begin{aligned} \Delta E &= 2.18 \times 10^{-18} \text{ J}_{\text{photon}}^{-1} \\ &= (2.18 \times 10^{-18} \times 10^{-3}) \text{ kJ}_{\text{photon}}^{-1} \\ &= (2.18 \times 10^{-21}) (6.022 \times 10^{23}) \text{ kJ mol}^{-1} \\ &= 1310 \text{ kJ mol}^{-1} \text{ (Ans)} \end{aligned}$$

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