

QUESTION

1. For the equilibrium, $A(g) \rightleftharpoons B(g)$, ΔH is -40 kJ/mol. If the ratio of the activation energies of the forward (E_f) and reverse (E_b) reactions is $2/3$ then:

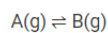
(1) $E_f = 60$ kJ / mol; $E_b = 100$ kJ/mol

(2) $E_f = 30$ kJ / mol; $E_b = 70$ kJ/mol

(3) $E_f = 80$ kJ / mol; $E_b = 120$ kJ/mol

(4) $E_f = 70$ kJ / mol; $E_b = 30$ kJ/mol

ANSWER :



Given $\Delta H = -40$ kJ/mol

$$E_f / E_b = \frac{2}{3}$$

$$\therefore E_f = \frac{2}{3} E_b$$

$$\Delta H = E_b - E_f$$

$$-40 = E_b - \frac{2}{3} E_b$$

$$-40 = \frac{1}{3} E_b$$

$$\therefore E_b = -40 \times 3 = -120 \text{ kJ/mol}$$

$$E_f = E_b - \Delta H$$

$$= -120 - (-40)$$

$$= -120 + 40$$

$$= -80 \text{ kJ/mol}$$

Hence option (3) is the answer.