7. The standard Gibbs energy change at 300 K for the reaction 2A ⇌B + C is 2494.2 J. At a given time, the Composition of the reaction mixture is $[\mathrm{A}] = \frac{1}{2}, [\mathrm{B}] = 2 \text{ and } [\mathrm{C}] = \frac{1}{2}$. The reaction proceeds in the :[R=8.314 J/K/mol, e=2.718]

(1) forward direction because Q > K_C
(2) reverse direction because Q > K_C
(3) forward direction because Q < K_C
(4) reverse direction because Q < K_C

Answer:

2A ⇌B + C, ΔG=2494.2

$$\Delta G = \Delta G^0 + RTlnQ$$

$$or\ 0 = 2494.2 + 8.314 \times 300 \mathrm{lnK_c}$$

$$or\ -1 = \mathrm{lnK_c}$$

$$or\ \mathrm{K_c} = \frac{1}{2.7}$$

Now 2A ⇌B + C

$$Q = \frac{[B][C]}{[A]^2} = \frac{2 \times \frac{1}{2}}{\left(\frac{1}{2}\right)^2} = 4$$

Here $Q > \mathrm{K_c}$ this implies reaction shifted in reverse direction.

Correct option is (2) reverse direction because Q > K_C