## [JEE (Main)-2015]

The standard Gibbs energy change at 300 K for the reaction $2A \rightleftharpoons B + C$ is 2494.2 J. At a given time, the composition of the reaction mixture is $[A] = \frac{1}{2}$, $[B] = 2$ and $[C] = \frac{1}{2}$. 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 $Q < K_C$

Sol:

$$2A \rightleftharpoons B + C$$

$$\Delta G^\circ = 2494.2$$

So, $-RT \ln K_c = 2494.2$

$$\Rightarrow \ln K_c = \frac{-2494.2}{8.314 \times 300} = -1.$$

So, $K_c = 1/e.$

Also, at given instant,

$$Q = \frac{[B][C]}{[A]^2} = \frac{2 \cdot 1/2}{(1/2)^2} = 4.$$

Clearly, $Q > K_c$

$\Rightarrow$ Reverse direction.