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 : $[R = 8.314 \text{ J/K/mol}, e = 2.718]$

(1) reverse direction because $Q > K_c$

(2) forward direction because $Q < K_c$

(3) reverse direction because $Q < K_c$

(4) forward direction because $Q > K_c$

For equilibrium, $2A \rightleftharpoons B + C, \Delta G^\circ = -RT \ln K_c$

$$\therefore \ln K_c = -\frac{\Delta G^\circ}{RT} = -\frac{2494.2}{8.314 \times 300} = -1$$

$$\therefore K_c = \frac{1}{e} \approx \frac{1}{2.7}$$

For the reaction, $2A \rightarrow B + C, Q_c = \frac{[B][C]}{[A]^2}$

$$\therefore Q_c = \frac{2 \times \frac{1}{2}}{\left(\frac{1}{2}\right)^2} = 4$$

Clearly, $Q_c > K_c$

Large value of Q_c implies larger numerator in the expression $\frac{[B][C]}{[A]^2}$. Larger concentration on the right side of the reaction, $2A \rightarrow B + C$ means that the reaction should move towards left to attain equilibrium.

Hence, (1).