for the reaction $N_2O_4 (g) \rightleftharpoons 2NO_2 (g)$, the value of k is 50 at 400 K and 1700 at 500 K. Which of the following options is correct??

(a) Reaction is endothermic

(b) Reaction is exothermic

(c) N_2O_4 and $NO_2 (g)$ are mixed at partial pressure 20 bar and 200 bar respectively at 400 K, more N_2O_4 is formed.

(d) Entropy of system increases.

Sol. The value of equilibrium constant increases with increase in temperature.

$\Rightarrow$ Reaction is endothermic.

At 400 K; $Q = \dfrac{P_{NO_2}^2}{P_{N_2O_4}} = \dfrac{(20)^2}{2} = 200 > k = 50$

So Equilibrium will shift backward and more N_2O_4 is formed.

Since the number of moles(g) increases from (1) to (2), the forward op^n is accompanied by increase in entropy.

$\Rightarrow$ (a), (c), (d) are correct.