

For the reaction, $2A + B \rightarrow \text{products}$, when the concentrations of A and B both were doubled the rate of the reaction increased from $0.3 \text{ mol L}^{-1} \text{ s}^{-1}$ to $2.4 \text{ mol L}^{-1} \text{ s}^{-1}$. When the concentration of A alone is doubled, the rate increased from $0.3 \text{ mol L}^{-1} \text{ s}^{-1}$ to $0.6 \text{ mol L}^{-1} \text{ s}^{-1}$. Which one of the following statements is correct?

- (1) Order of the reaction with respect to B is 2.
- (2) Order of the reaction with respect to B is 1.
- (3) Order of the reaction with respect to A is 2.
- (4) Total order of the reaction is 4.

Solution:

If concentration of [A] is doubled, then the rate will be doubled, so the order of A is 1.

Then again if the concentration of A and B both were doubled, the rate will increase 8 times. $\text{Rate} = [2A] [2B]^2 = 8[A] [B]^2$

So the order of B is two.

So, the overall order is 3.