

Answer on Question #67064 - Chemistry - Physical Chemistry

Question: The optical rotations of sucrose in 0.5 M HCl measured in seconds at 0, 20 and ∞ are +32.4, +25.5 and -11.1 respectively. Determine the order of the reaction.

Solution:

$$v = k \cdot C_{\text{sucrose}} \cdot C_{\text{HCL}}$$

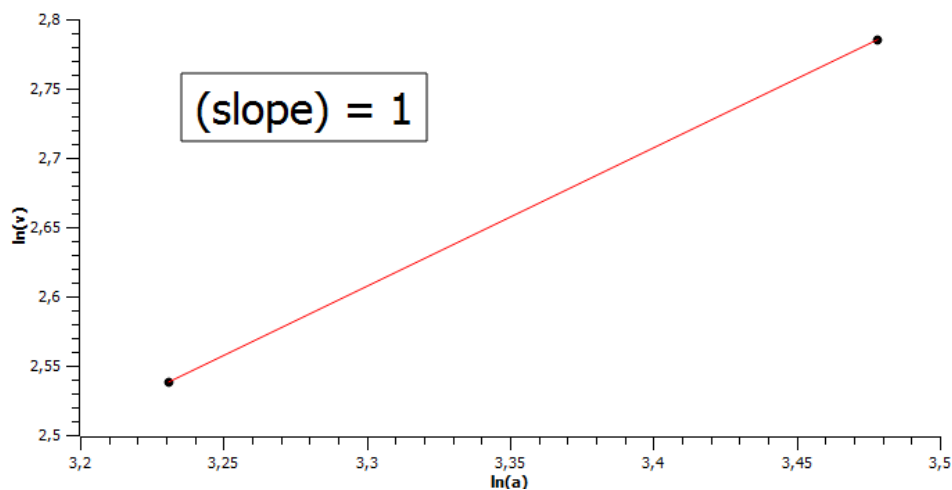
$$a_{\text{sucrose}} = k' \cdot C_{\text{sucrose}}$$

$$v_1 = k \cdot a_{1\text{sucrose}} = k \cdot 32.4 \cdot 0.5 = 16.20$$

$$v_2 = k \cdot a_{2\text{sucrose}} = k \cdot 25.5 \cdot 0.5 = 12.75$$

$$v_3 = k \cdot a_{3\text{sucrose}} = -k \cdot 11.1 = -5.55$$

We plot the graph in the coordinates $\ln(v) - \ln(a)$, the slope of the slope will correspond to the order of the reaction.



Answer: the order of the reaction is 1.