

Problem 1-04 First-order reactions

The rate constant of the first-order reaction $2\text{A} \rightarrow \text{products}$ was found to be $k_c = 0.005 \text{ min}^{-1}$. Determine what is the amount of A (in per cents of initially present A) remains unreacted after 3 hours from the beginning of the reaction.

[16.53 % A remains unchanged]

Řešení:

$$\tau = 3 \text{ h} = 180 \text{ min}$$

$$c_{A0} = 100 \%$$

$$\nu_A = -2$$

$$\frac{dc_A}{(-2) d\tau} = k_c \cdot c_A$$

$$\ln \frac{c_{A0}}{c_A} = |\nu_A| \cdot k_c \cdot \tau = 2 \cdot 0.005 \cdot 180 = 1.8$$

$$\frac{c_{A0}}{c_A} = 6.04965$$

$$c_A = 0.1653 c_{A0} \dots\dots 16.53 \% \text{ A remains unchanged}$$