جواب سوال 4

@ $T = 457 + 273 = 730\ K$

$\dot{\varepsilon}_s = 7.9 \times 10^{-10}\ 1/s$

@ $T = 607 + 273 = 880\ K$

$\dot{\varepsilon}_s = 10^{-5}\ 1/s$

با حل دو معادله دو مجهول Q و α را بدست می‌آوریم

$$\dot{\varepsilon} = \alpha \exp\left(\frac{-Q}{RT}\right)$$

$$\ln \dot{\varepsilon} = \ln \alpha - \frac{Q}{RT}$$

$$\begin{cases} \ln 7.9 \times 10^{-10} = \ln \alpha - \dfrac{Q}{8.314 \times 730} \\ \ln 10^{-5} = \ln \alpha - \dfrac{Q}{8.314 \times 880} \end{cases} \Rightarrow -9.446 = Q\left(\frac{-1}{8.314 \times 730} + \frac{1}{8.314 \times 880}\right)$$

$$\Rightarrow \boxed{Q = 336335\ \frac{J}{mol}}$$

$$\Downarrow$$

$$-11.513 = \ln \alpha - \frac{336335}{8.314 \times 880} \Rightarrow \boxed{\alpha = 9.23 \times 10^{14}}$$

$$\dot{\varepsilon}_s < 10^{-4}\ 1/s \Rightarrow 9.23 \times 10^{14} \exp\left(\frac{-336335}{8.314\ T}\right) = 10^{-4}$$

$$\Rightarrow T = \frac{-336335}{8.314 \times (-43.669)} \Rightarrow \boxed{T = 926.38\ K}$$

$$\Downarrow$$

تا قسمی دمای کاری