b) same story but now $\mathcal{Z}$ contains the term due to CO as well:

$$0.1 = \frac{\lambda_A e^{-\varepsilon_A/\tau}}{1 + \lambda_A e^{-\varepsilon_A/\tau} + \lambda_B e^{-\varepsilon_B/\tau}}$$

From above we know:

$$\lambda_A e^{-\varepsilon_A/\tau} = 9.$$

$$0.1 = \frac{9}{10 + \lambda_B e^{-\varepsilon_B/\tau}}$$

$\Leftrightarrow$

$$1 + 0.1\, \lambda_B e^{-\varepsilon_B/\tau} = 9.$$

$$\Rightarrow -\frac{\varepsilon_B}{\tau} = \log\left(\frac{80}{\lambda_B}\right) = \log\left(8 \cdot 10^8\right)$$

$$\varepsilon_B = -\tau \log\left(8 \cdot 10^8\right) = -0.25 \cdot 20.5 = \underline{\underline{-.57\,eV}}$$