Ch12 sec 7 worksheet

1.) $\ln\left(\frac{0.60\ sec^{-1}}{0.0105\ sec^{-1}}\right) = \frac{Ea}{8.3145\ J\,mol^{-1}K^{-1}} \times \left(\frac{1}{700.K} - \frac{1}{800.K}\right)$

$4.046 = \frac{Ea}{8.3145\ J\,mol^{-1}K^{-1}} \times 1.786 \times 10^{-4} K^{-1}$

$4.046 = Ea\ 2.148 \times 10^{-5}\ J^{-1}\,mol$

$\boxed{Ea = 1.9 \times 10^{5}\ J/mol}$

2) $\ln\left(\frac{K}{1.2 \times 10^{-2}\ L\,mol^{-1}s^{-1}}\right) = \frac{8.2 \times 10^{4}\ J\,mol^{-1}}{8.3145\ J\,mol^{-1}K^{-1}}\left(\frac{1}{300.K} - \frac{1}{500K}\right)$ .00333 − .00200

$= 13.14$

$\frac{K}{1.2 \times 10^{-2} L\ mol^{-1}sec^{-1}} = 5.140 \times 10^{5}$

$K = 6.168 \times 10^{3} = \boxed{6.2 \times 10^{3}\ L\,mol^{-1}s^{-1}}$

3) $\ln\left(\frac{1.8\ M^{-1}s^{-1}}{0.77 M^{-1}s^{-1}}\right) = \frac{1.13 \times 10^{5}\ J\,mol^{-1}}{8.3145\ J\,mol^{-1}K^{-1}}\left(\frac{1}{603K} - \frac{1}{T_2}\right)$

$\ln 2.338 = 1.359 \times 10^{-4} K\left(1.658 \times 10^{-3} K^{-1} - 1/T_2\right)$

$6.294 \times 10^{-5} K^{-1} = 1.658 \times 10^{-3} K^{-} - 1/T_2$

$1.596 \times 10^{-3} = 1/T_2 \qquad T_2 = 626.56 \rightarrow \boxed{630K.\ 357\ ^{\circ}C}$

4) $\ln\left(\frac{43s^{-1}}{1.4s^{-1}}\right) = \frac{Ea}{8.3145\ J\,mol^{-1}K^{-1}}\left(\frac{1}{400.K} - \frac{1}{450.K}\right)$

$3.424 = \frac{Ea}{8.3145\ J\,mol^{-1}K^{-1}} \times 2.778 \times 10^{-4} K^{-1}$

$1.23 \times 10^{-4}\ \cancel{K} \times 8.3145\ J\,mol^{-1}\cancel{K^{-1}} = 1.025 \times 10^{5}\ J/mol =$

$\boxed{1.0 \times 10^{5}\ J/mol}$