

Ch 12 sec 7 worksheet: Arrhenius Equation.

$$5) \ln \left(\frac{1.5 \times 10^{-3} \text{ s}^{-1}}{3.46 \times 10^{-5} \text{ s}^{-1}} \right) = \frac{E_a}{83145 \text{ J mol}^{-1} \text{ K}^{-1}} \left(\frac{1}{298 \text{ K}} - \frac{1}{328 \text{ K}} \right)$$

$$\frac{3.769}{3.069 \times 10^{-4} \text{ K}^{-1}} = \frac{E_a}{8.3145 \text{ J mol}^{-1} \text{ K}^{-1}} \quad E_a = 1.0211 \times 10^5 \text{ J/mol}$$

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

$$6) \ln(3) = \frac{E_a}{8.3145 \text{ J mol}^{-1} \text{ K}^{-1}} \left(\frac{1}{300 \text{ K}} - \frac{1}{310 \text{ K}} \right)$$

$$\frac{1.099}{1.075 \times 10^{-4} \text{ K}^{-1}} = \frac{E_a}{8.3145 \text{ J mol}^{-1} \text{ K}^{-1}} \quad E_a = 85001 \times 10^4$$

$$\boxed{E_a = 8.50 \times 10^4 \text{ J/mol}}$$

$$7) \ln k = \frac{-1.00 \times 10^5 \text{ J mol}^{-1}}{8.3145 \text{ J mol}^{-1} \text{ K}^{-1}} \times \frac{1}{673 \text{ K}} + \ln(6.00 \times 10^{12} \text{ mol L}^{-1} \text{ s}^{-1})$$

↑
units for
A + k match

$$= -1.203 \times 10^4 \text{ K} \times 1.486 \times 10^{-3} \text{ K}^{-1} + 29.42$$

$$= -17.88 + 29.42$$

$$= 11.54$$

$$k = 1.027 \times 10^5 = \boxed{1.03 \times 10^5 \text{ mol}^{-1} \text{ sec}^{-1}}$$