$$B = 215 \exp\left(-\frac{0.70 \text{ eV}}{kT}\right) = (215) \exp\left[-\frac{0.70 \text{ eV}}{(8.62 \times 10^{-5} \text{ eV/atom} - \text{K})(1000 + 273 \text{ K})}\right]$$
$$= 0.365 \,\mu\text{m}^2/\text{h}$$

And computation of the time t from the rearranged form of Equation 18.37, leads to

$$t = \frac{x^2}{B} = \frac{(0.100 \,\mu\text{m})^2}{0.365 \,\mu\text{m}^2/\text{h}}$$
$$= 0.0274 \,\text{h} = 98.6 \,\text{s}$$

And at 700°C, the value of B is

$$B = (215) \exp\left[-\frac{0.70 \text{ eV}}{(8.62 \times 10^{-5} \text{ eV/atom-K})(700 + 273 \text{ K})}\right] = 0.0510 \,\mu\text{m}^2/\text{h}$$

Whereas the time required to grow the 100 nm oxide layer is

$$t = \frac{x^2}{B} = \frac{(0.100 \ \mu \text{m})^2}{0.0510 \ \mu \text{m}^2 / \text{h}}$$
  
= 0.196 h = 706 s

From the above computations, it is very apparent (1) that the 100 nm oxide layer forms more rapidly at 1000°C (than at 700°C) in both  $O_2$  and  $H_2O$  gaseous atmospheres, and (2) that the oxide layer formation is more rapid in water vapor than in oxygen.

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