Prob. 19.17 - Arrhenius form of t-T shifting equation

General Arrhenius expression for relaxation time:

\[ \tau = \tau_0 \exp \frac{E^*}{RT} \]

Base-10 logarithmic form:

\[ \log \tau = \log \tau_0 + \frac{E^*}{2.303RT} \]

Logarithmic form at reference temperature:

\[ \log \tau_{\text{ref}} = \log \tau_0 + \frac{E^*}{2.303R_T\text{ref}} \]

Subtracting these two expressions:

\[ \log \tau - \log \tau_{\text{ref}} \equiv \log a_T = \frac{E^*}{2.303R} \left( \frac{1}{T} - \frac{1}{T_{\text{ref}}} \right) \]

Prob. 19.18 - Time-temperature equivalence

![Graph showing log \( \tau \) vs. \( \frac{1}{T} \) with a straight line indicating \( E = \text{slope} \times 2.303 \times R \) = 222 kJ/mol]
WLF, $T_g = -35 \, ^\circ C$, offset = 7.03