Due: Sept. 05, 2006

Using the data in the Table below obtained for the reaction (Lente, *New. J. Chem.* **2005**, 759)

$$H_3O^+ + S_2O_6^{-2} \rightarrow H_2O{\bullet}SO_2 + HSO_4^-$$

T (ºC)	T (K)	k ($M^{-1}s^{-1}$)
50.0	323.2	9.54×10^{-7}
55.0	328.2	1.91×10^{-6}
60.0	333.2	3.76×10^{-6}
65.0	338.2	7.33×10^{-6}
70.0	343.2	1.38×10^{-5}
75.0	348.2	2.56×10^{-5}
80.0	353.2	4.71×10^{-5}
85.0	358.2	8.43×10^{-5}
90.0	363.2	1.47×10^{-4}

Determined $\Delta H^{\neq}$ and $\Delta S^{\neq}$ by two methods:

(a) $$\ell n \frac{k}{T} = - \frac{\Delta H^{\neq}}{RT} + \frac{\Delta S^{\neq}}{R} + \ell n \frac{k_B}{h}$$ k_B = Boltzmann's constant

plot $\ell n \frac{k}{T}$ *vs* $\frac{1}{T}$

(b) $$T \times \ell n \frac{k}{T} = T \times \left(\ell n \frac{k_B}{h} + \frac{\Delta S^{\neq}}{R} \right) - \frac{\Delta H^{\neq}}{R}$$

plot $T \times \ell n \frac{k}{T}$ *vs* T