Pre-Lab Day 5/6

Consider the following hypothetical reaction between the species A (*aq*) and B (*aq*) to yield AB_2 (*aq*):

$$A\,(aq) + 2\,B\,(aq) \longrightarrow AB_2\,(aq)$$

Using the isolation method, it is found that the rate law is second order in A(aq), first order in B(aq), and third order overall. When 30.00 mL of 0.600 M A(aq) is combined with 20.00 mL of 0.500 M B(aq) at 25.0 °C, the initial rate of reaction is found to be 1.94×10^{-6} M/s. When 20.00 mL of 0.600 M A(aq) is combined with 30.00 mL of 0.500 M B(aq) at 50.0 °C, the initial rate of reaction is found to be 6.52×10^{-6} M/s. As always, assume that all aqueous solution volumes are additive and that ionic strength was constant.

(a) Determine the rate constant of this reaction (in units of M and s) at each temperature (25.0 °C & 50.0 °C) and also determine the activation energy of this reaction (in kcal per mole of A (*aq*)). Show all work.

(b) Clearly state any assumptions that had to be made in order to successfully carry out any of the computations in (a).

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