

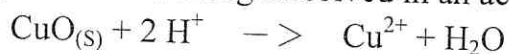
(1) Determine A and E_a from the following data:

T/K	300	350	400	450	500
k/(L mol ⁻¹ s ⁻¹)	7.9×10^6	3.0×10^7	7.9×10^7	1.7×10^8	3.2×10^8

(10 points)

(2) Sr^{90} is a radioactive nuclide found in water and many food. It has a half-life of 28 years and decays as a first-order reaction. Suppose the concentration of Sr^{90} in a water sample is to be reduced by 99.9%. How long would this take? (10 points)

(3) Cupric oxide is being dissolved in an acidic solution.



The rate of disappearance of H^+ ions can be expressed as: $-d\text{C}_{\text{H}^+}/dt = k \text{C}_{\text{H}^+}^2$

Where $k = 0.001 \text{ L/mol}\cdot\text{sec}$ at 25°C

(a) Find the rate expression of Cu^{2+} and evaluate the new rate constant.

(b) The activation energy using the Arrhenius expression was found to be 10 kcal/mol. Calculate the rate constant in (a) for 60°C .

(20 points)

(4) Liquid A decomposes by first order kinetics in a batch reactor, 50% A is converted in a 5-min run. How much longer would it take to reach 75% conversion? Repeat this for a second order kinetics. (10 points)