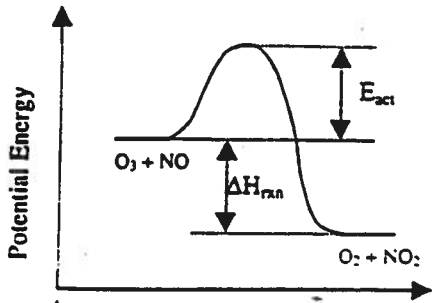
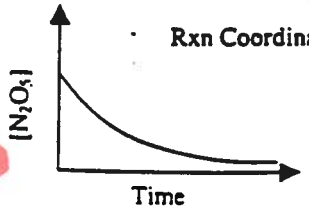
Question 6
(8 points)

(a) Response must clearly indicate (and distinguish between) E_{act} and ΔH_{rxn} on graph. — *2 pts*

- *Each earns one point*



(b) i. Response shows a softly curving line that approaches the time axis and whose slope changes continually. — *1 pt*



- *No penalty if curve crosses time axis or levels out above time axis.*
- *Curve must drop initially and continually. No credit earned if $[N_2O_5]$ increases.*

ii. Reaction Rate is the slope of the line tangent to any point on the curve. — *1 pt*
- *Rate must be tied somehow to slope of graph.*
- *Answer may be indicated directly on the graph.*
- *Instantaneous rate must be indicated rather than the average rate.*

iii. Since "rate = slope = $k[N_2O_5]$", the value of k can be determined algebraically from the slope at a known value of $[N_2O_5]$. — *1 pt*
- *No penalty for "Rate $= 2k[N_2O_5]$", as reaction stoichiometry could suggest this answer.*
- *Point can be earned for rate constant = slope of graph of $ln[N_2O_5]$ vs. time since reaction is first order.*
- *Use of half-life or integrated rate law to solve for k can be accepted.*

iv. The value of the rate constant is independent of the reactant concentrations, so adding more reactant will not affect the value of k. — *1 pt*
- *No point earned for simply stating that value of k will not change.*
- *Response must distinguish between rate and rate constant.*

(c) i. Rate $= k[A]$ or $\ln([A]/[A]_0) = -kt$. Since graph of ln [A] vs. time is linear, it must be a first-order reaction. — *1 pt*
- *Either form of the rate law is acceptable, and both the equation and the brief justification are required to earn the point.*
- *No point earned if response indicates first order because the first graph is not linear.*

ii. Determine the slope of the second graph and set "k = –slope." — *1 pt*
- *Response must indicate both the negative sign and the slope.*