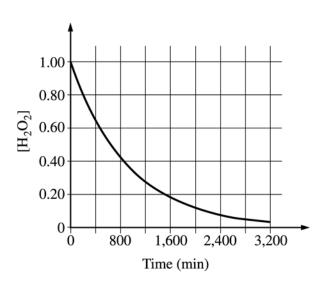
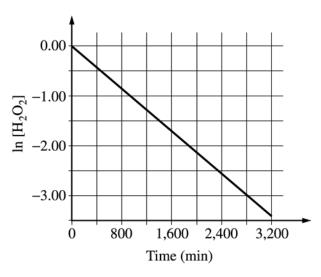
## 2004 AP® CHEMISTRY FREE-RESPONSE QUESTIONS (Form B)

$$2 \text{ H}_2\text{O}_2(aq) \rightarrow 2 \text{ H}_2\text{O}(l) + \text{O}_2(g)$$

- 3. Hydrogen peroxide decomposes according to the equation above.
  - (a) An aqueous solution of  $H_2O_2$  that is 6.00 percent  $H_2O_2$  by mass has a density of 1.03 g mL<sup>-1</sup>. Calculate each of the following.
    - (i) The original number of moles of  $H_2O_2$  in a 125 mL sample of the 6.00 percent  $H_2O_2$  solution
    - (ii) The number of moles of  $O_2(g)$  that are produced when all of the  $H_2O_2$  in the 125 mL sample decomposes
  - (b) The graphs below show results from a study of the decomposition of  $H_2O_2$ .





- (i) Write the rate law for the reaction. Justify your answer.
- (ii) Determine the half-life of the reaction.
- (iii) Calculate the value of the rate constant, k. Include appropriate units in your answer.
- (iv) Determine  $[H_2O_2]$  after 2,000 minutes elapse from the time the reaction began.