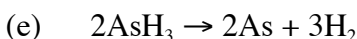
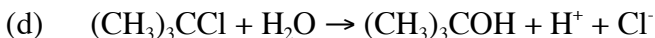
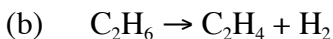
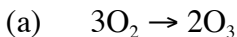


**Problem Set 20: Overview of Kinetics, Zero Order Reactions**

**Due Nov 11, 2008**

1. Problem 9.1 (p. 356):  
Write the rates for the following reactions in terms of the disappearance of reactants and appearance of products:



2. Problem 9.3 (p. 356)  
What are the units of the rate constant for a third order reaction?

3. Many reactions show “zero order” behavior under certain conditions. Consider the following equation for the reaction of an enzyme:

$$v = \frac{d[\text{Product}]}{dt} = \frac{V_{\max}[\text{Substrate}]}{K_M + [\text{Substrate}]}$$

Assume that  $V_{\max} = 10 \text{ M/sec}$  and that  $K_M$  is  $1 \text{ mM}$ . Draw a plot with  $v$  on the y-axis and  $[\text{Substrate}]$  on the x-axis for this equation. Use substrate concentrations from  $0.5 \text{ mM}$  to  $50 \text{ mM}$ .

4. What is the maximum value that  $d[\text{Product}]/dt$  can have using the numbers from problem 3?
5. For a reaction in which  $d[A]/dt = -\text{constant}$ , integrate the equation so that you get an equation giving  $[A]$  at any time greater than 0. Do not assume that the initial concentration of A is zero.