Name Key SS# _____

Quiz 3 CHM 1046 May 30, 2002

1. Consider the following reaction: $2\,A + B \rightarrow C + 3\,D$. $\Delta[A]/\Delta t = -4.6 \times 10^{-4}$ M / sec.

   A. Calculate the rate of the reaction.

$$\text{rate} = -\frac{1}{a}\frac{\Delta[A]}{\Delta t} = -\frac{1}{2}(-4.6\times10^{-4}\ M/sec) = 2.3\times10^{-4}\ M/sec$$

   B. Calculate $\Delta[D]/\Delta t$.

$$\text{rate} = \frac{1}{3}\left(\frac{\Delta[D]}{\Delta t}\right)$$

$$2.3\times10^{-4}\ M/sec = \frac{1}{3}\left(\frac{\Delta[D]}{\Delta t}\right) \Rightarrow \frac{\Delta[D]}{\Delta t} = 6.9\times10^{-4}\ M/sec$$

2. Consider the initial rates listed in the table for the reaction $2\,A + B \rightarrow 2\,C$

Experiment	Initial [A]	Initial [B]	Initial rate (M / sec)
1	0.13	0.20	0.010
2	0.26	0.20	0.040
3	0.13	0.10	0.0050

   A. What is the differential rate law?

Compare exp 1 + 3 $\Rightarrow$ rate $\propto [B]^1$

Compare exp 1 + 2 $\Rightarrow$ rate $\propto [A]^2$

$$\text{rate} = k[A]^2[B]$$

   B. Determine k (the rate constant).

using exp #1 $\quad \text{rate} = k[A]^2[B]$

$$0.010\ M/sec = k[.13]^2[.20]$$

$$k = 2.95\ \frac{1}{M^2 sec}$$

   C. What is the reaction rate when both reactant concentrations are 0.15?

$$\text{rate} = k[A]^2[B]$$

$$= 2.95\ \frac{1}{M^2 sec}(.15)^2(.15)$$

$$= 0.010\ M/sec$$