Answer key

Session 1/ CH 117
14 Jan. 2014

1. Explain the difference between thermodynamics and kinetics.

thermodynamics: tells us about the stability of the products vs. reactants. related to ΔG, tells us what equilibrium will look like, but not how fast we will get there

kinetics: concerned with rate of reaction & speed gives us information regarding reactivity.

2. Name 4 properties that affect the rate of reaction of homogenous mixtures.

- Properties of reactants & products
- Concentration
- temperature - how
- Catalyst - how

3. Calculate the Av. Speed of the following reaction A+B → AB from 0 to 2 seconds and 2 to 4 seconds.

Change in Concentration of A

Time (s)	Concentration (M/s)
0	10
2	8
4	4

$\frac{10-8}{0-2} = \frac{2}{2} = -1$

$\frac{8-4}{2-4} = \frac{4}{-2} = -2$

*4. True or False: Would using the concentration change of AB per second result in the same reaction rate.

Yes, but the answer would be positive

*5. Write the rate formula for each species in the following reaction (write it in the way that the rate of the reaction does not depend on which species we measured):
$8Fe + S_8 \rightarrow FeS_8$ ex. For species S, rate formula is rate= $\Delta[S]/\Delta t$.

$$\text{rate} = \frac{\Delta[Fe]}{8\,\Delta t} = \frac{\Delta[S_8]}{\Delta t} = \frac{\Delta[FeS_8]}{\Delta t}$$

$\frac{\text{Conc}}{\text{time}} / \text{conc} = \frac{1}{t}$

*6. What is the Units of K for the following reaction? What's the order?
Rate= k [A][B]^2

conc.^{2} t

K units is $\frac{1}{\text{conc. time}}$

Order is 2

7. Use the Data from the table to determine the rate law expression.
2A + B → P

Experiment	[A]	[B]	Initial Rate (M/s)
1	.2	.1	$2 * 10^{-2}$
2	.2	.2	$4 * 10^{-2}$
3	.3	.5	$3 * 10^{-2}$
4	.4	.1	$2 * 10^{-2}$

Rate = k[B]

b. Using experiment 1, find k.

$2 \times 10^{-2} = k[.1]$

$k = .2$

c. True or False. If 1/[B] is graphed as a function of time (t on x-axis), the graph would be linear.

False, the reaction is first order. You need to ln it.

d. Find concentration of B at t=2 if initial concentration of B is 2.

$\ln[B]_t = -kt + \ln[B_0]$

$(-.2)(2) + \ln(2)$

$-.4 + .6931$

$\ln[B]_t = .293$

$e \qquad e$

$[B]_t = 1.341$