Skill Practice 44

Concentration & Time Practice

Name: _____

Date: _____

Hour: _____

1. Given the following reaction and data, answer the following questions.

$$2NOCl \rightarrow 2NO + Cl_2$$

Time (s)	[NOCl] (M)
0	0.200
575	0.158
995	0.137
2080	0.102

a) How does the rate of disappearance of NOCl compare to the rate of appearance of Cl_2?
The rate of disappearance of NOCl is twice the rate of appearance of Cl_2.

b) Is this reaction 1st order or 2nd order with respect to [NOCl]?
2nd

c) Calculate the rate constant, k, and include units.
k = 0.00231 1/M-s

d) What is the average rate of reaction between time 0 and 995 s?
6.33×10^{-5} M/s

e) Describe how you would find the instantaneous rate of reaction at 700 s using a plot of concentration verses time.
Plot 1/concentration vs. time and take the slope of the tangent line at 700 s.

f) Write the rate law for this reaction.
rate = $k[NOCl]^2$

g) Calculate the rate of disappearance of NOCl at time = 1550 s.
3.13×10^{-5} M/s

h) Calculate the rate of appearance of Cl_2 at time = 750 s.
2.54×10^{-5} M/s

2. Aspirin decomposes into acetic acid and salicylic acid. The following data was obtained during experimentation.

Time (min.)	[Aspirin], M
0	1.000
5	0.630
10	0.460
15	0.362

a) What is the order of the reaction with respect to aspirin?
2nd order

b) What is the rate constant for this reaction?
k = 0.117 1/M-s

c) How long will it take for the aspirin concentration to reach a value of 0.20 M?
34 minutes