

Skill Practice 44

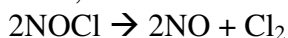
Concentration & Time Practice

Name: _____

Date: _____

Hour: _____

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



| 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 Cl₂?
The rate of disappearance of NOCl is twice the rate of appearance of Cl₂.
- 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?
6.33x10⁻⁵ M/s
- e) Describe how you would find the instantaneous rate of reaction at 700 s using a plot of concentration versus 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.
3.13x10⁻⁵ M/s
- h) Calculate the rate of appearance of Cl₂ at time = 750 s.
2.54x10⁻⁵ 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