

Problem Set: Integrated Rate Laws

1. Sulfuryl chloride (SO_2Cl_2) decomposes to sulfur dioxide and chlorine by reaction in the gas phase. The following pressure data were obtained when a sample containing 0.0500 mol sulfuryl chloride was heated to 600. K in a 0.500 L container. The rate is defined as $-\Delta[\text{SO}_2\text{Cl}_2]/\Delta t$. You can use Excel or graph by hand.

Time (hours)	Pressure (atm)
0	4.93
1	4.26
2	3.52
4	2.53
8	1.3
16	0.34

- a. What is the reaction order with respect to sulfuryl chloride?
 - b. Determine the value of the rate constant (with unit!) for the decomposition of SO_2Cl_2 at 600K
 - c. What is the half-life of the reaction?
-
2. A substance XY decomposes in a second-order reaction. A solution that is initially 1.00 M in XY requires 0.50 hours for its concentration to decrease to 0.50 M. How much time will it take for a solution of XY to decrease in concentration from 2.00 M to 0.25 M?

