$P = \frac{n}{V}RT$ $PV = nRT$

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 $-\Delta[SO_2Cl_2]/\Delta t$. You can use Excel or graph by hand.

Time (hours)	Pressure (atm)	ln P	1/P
0	4.93	1.60	0.203
~~1~~	4.26	1.45	
2	3.52	1.26	
4	2.53	0.93	
8	1.3	0.26	
16	0.34	-1.08	

-0.67

a. What is the reaction order with respect to sulfuryl chloride?

1st order

b. Determine the value of the rate constant (with unit!) for the decomposition of s at 600K

ln P vs hours

$k = 0.16\ hr^{-1}$

c. What is the half-life of the reaction?

$t_{1/2} = \frac{0.693}{k}$ $t_{1/2} = \frac{0.693}{0.17\ hr^{-1}}$

4.1 hours

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?

should be 1.00 M!

disregard this problem