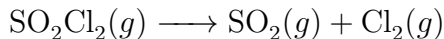


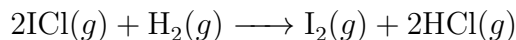
CHM 330 - Worksheet 3
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Spring 2022

1. At 320°C and normal atmospheric pressure, the unimolecular decomposition of sulfuryl chloride,



proceeds via first order kinetics with a half life of 525 minutes. If the initial concentration of sulfuryl chloride is 0.125 M:

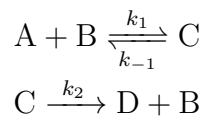
- (a) What will be the concentration after 12 hours?
(b) How long, in hours, will it take 95% of the SO_2Cl_2 to decompose?
2. The following kinetic data were obtained for the reaction



Experiment	Initial [ICl] $\text{mol}\cdot\text{L}^{-1}$	Initial [H ₂] $\text{mol}\cdot\text{L}^{-1}$	Initial Rate $\text{mol}\cdot\text{L}^{-1}\cdot\text{s}^{-1}$
1	1.5×10^{-3}	1.5×10^{-3}	3.7×10^{-7}
2	3.0×10^{-3}	1.5×10^{-3}	7.4×10^{-7}
3	3.0×10^{-3}	4.5×10^{-3}	2.2×10^{-6}
4	4.7×10^{-3}	2.7×10^{-3}	?

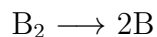
What is the initial rate in experiment 4?

3. For the following two-step mechanism;



Use the steady state approximation and derive the proposed rate law for the disappearance of A.

4. Kinetic experiments were performed on the **first order** reaction



to determine the reaction's temperature dependence. The resulting data are found in the table below

Experiment	Initial [B ₂] mol·L ⁻¹	Temperature °C	Initial Rate (mol B ₂)·L ⁻¹ ·s ⁻¹
1	0.10	150	3.2×10 ⁻⁴
2	0.20	300	6.0×10 ⁻³
3	0.15	250	?

What is the **predicted rate** in the third experiment?

5. For a sugar (S) that reacts with an enzyme (E) via the Michaelis-Menten mechanism



the following two points of kinetic data were obtained:

Experiment	Initial [S] mol·L ⁻¹	Initial Rate (mol S)·L ⁻¹ ·s ⁻¹
1	1.0	0.5459
2	2.5	0.9208

Using the Lineweaver-Burk method what is the value of

(a) V_{\max}

(b) K_M

Please express your results to two significant figures.