Name
Rate Constants/ Determination of Rates

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1. (Brady580) What is the rate of the reaction below at 0C when the reactant concentrations are the following: $[H_2SeO_3] = 2.0E\text{-}2M$, $[I^-] = 2.0E\text{-}3M$, $[H^+] = 1.0E\text{-}3M$?
$H_2SeO_3 + 6I^- + 4H^+ \rightarrow Se + 2I_3^- + 3\ H_2O$ Rate $= k[H_2SeO_3][I^-]^3[H^+]^2$ $k = 5.0E5$ L/mol s

$5.0E5(2.0E\text{-}2)^1(2.0E3)^3[1.0E\text{-}3]^2 = 8.E\text{-}11 \frac{mol}{Ls}$

2. (Brady584) Sulfuryl Chloride, SO_2Cl_2, is used to manufacture the antiseptic Chlorophenol. The following data were collected on the decomposition of SO_2Cl_2, at a constant temperature. The experiment is tracking the production of SO_2 production. Determine rate equation, rate constant, and the units for the rate constant.

$SO_2Cl_{2(g)} \rightarrow SO_{2(g)} + Cl_{2(g)}$

SO_2Cl_2 M	SO_2 M/s
0.100	2.2E-6
0.200	4.4E-6
0.300	6.6E-6

$Rate = K[SO_2Cl_2]$
$Rate = K[.1]$
$2.2E\text{-}6 = K[.1]$
$K = 2.2E\text{-}7 \frac{1}{sec}$

3. (Brady585) The following data was measured for the reduction of nitric oxide with hydrogen. Determine the rate law of the reaction.

$2NO(g) + 2H_2(g) \rightarrow N_2(g) + 2H_2O(g)$

Experiment	[NO]	$[H_2]$	Rate of formation of H_2O
1	0.10	0.10	1.23E-3Mol/L s
2	0.10	0.20	2.46 E-3 mol/L s
3	0.20	0.10	4.92E -3 mol/L s

$Rate = K[NO]^2[H_2]^1$

4. (Kotz698) The rate of the reaction between CO and NO_2 ($CO + NO_2 \rightarrow CO_2 + NO$) was studied at 540K starting with various concentrations of CO and NO_2 and Data in the table were collected. Determine the rate equation from these data. What is the value of the rate constant?

Experiment	[CO] M	$[NO_2]$ M	Initial rate mol/L h
1	5.10E-4	0.350E-4	3.4E-8
2	5.10E-4	0.700E-4	6.8E-8
3	5.10E-4	0.185E-4	1.7E-8
4	1.02E-3	0.350E-4	6.8E-8
5	1.53E-3	0.350E-4	10.2E-8

$Rate = K[CO]^0[O_2]^1$
$3.4E\text{-}8 = K[0.35E\text{-}4]$
$K = 9.7E\text{-}4 \frac{1}{h}$