	GP1	GP2	GP3	GP4
4mL H2O2	0.25252	0.23664	0.19078	0.14273
3mL H2O2	0.076834	0.14906	0.19063	0.090485
2mL H2O2	0.097732	0.10347	0.016819	0.05649
RT			0.016819	0.14273
31℃		0.10459	0.6978	
36℃		0.32956	0.10562	
30℃	0.041523	0.037956	0.0083693	0.019429
35℃	0.095913	0.11599	0.036425	0.035022
45℃	0.11588			

H2O2 Concentration change w/ Catalase	H2O2 Temp change w/ Catalase	H2O2 Temp change w/ KI

H2O2 and Catalase Data Table

	Trial 1.1	Trial 1.2	Trial 1.3	Trial 2.1	Trial 2.2	Trial 2.3
Avg Initial Reaction (kpa/s)	0.20566	0.12675	0.06863	0.07977	0.40119	0.21759
Temperature	299.15	299.15	299.15	299.15	304.15	309.15
Concentration (M)	0.024	0.0135	0.006	0.024	0.024	0.024
Volume (mL)	4	3	2	4	4	4

H2O2 and Catalase Data Table

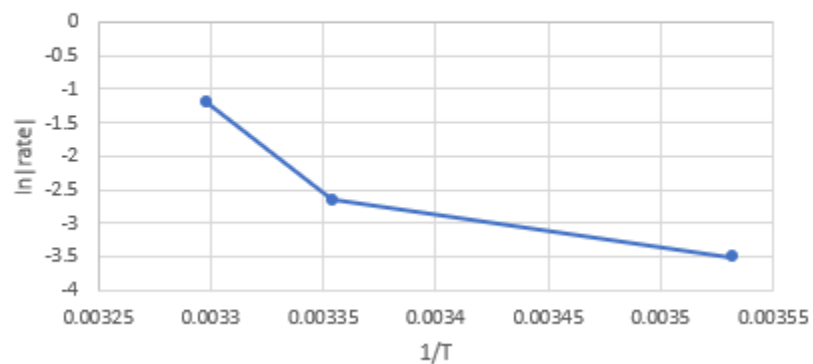|	Trial 3.1	Trial 3.2	Trial 3.3
Avg Initial Reaction (kpa/s)	0.02682	0.07084	0.011588
Temperature	303.15	308.15	318.15

Reaction Rate vs. Concentration
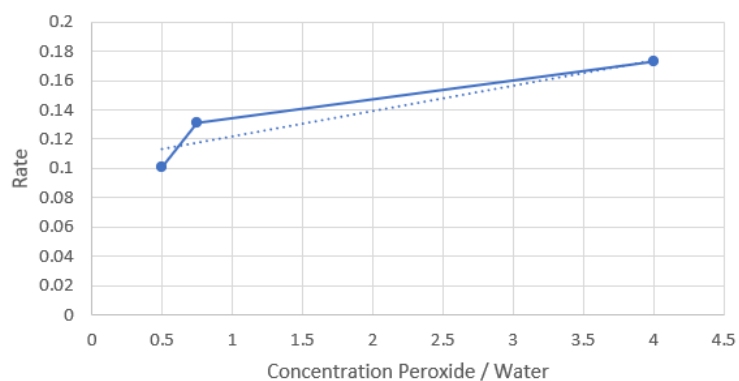
ln|rate| as a Function of 1/T
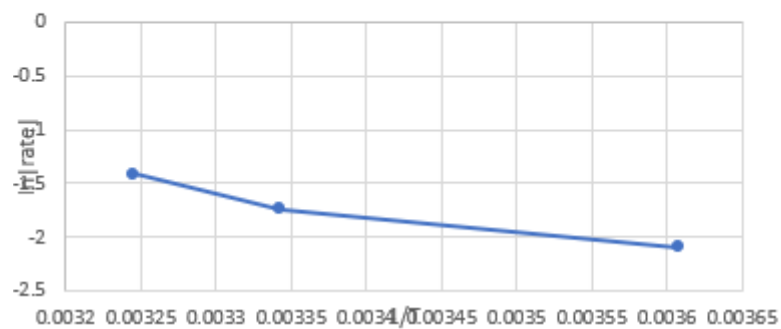
ln|rate| as a Function of 1/T

CHM1311 L5 Calculations

Finding Concentration of H_2O_2 Trials

Assuming a solution of 6 mol/L

4mL:

$$C_{H_2O_2} = 6mol/L \cdot 0.004L = 0.024M$$

3mL

$$C_{H_2O_2} = 6mol/L \cdot 0.003L = 0.018M$$

$$C_{Tot} = \frac{v_1}{v_2} \cdot C_{H_2O_2}$$

$$C_{Tot} = \frac{0.003L}{0.004L} \cdot 0.018M$$

2mL

$$C_{H_2O_2} = 6mol/L \cdot 0.002L = 0.012M$$

$$C_{Tot} = \frac{v_1}{v_2} \cdot C_{H_2O_2}$$

$$C_{Tot} = \frac{0.002L}{0.004L} \cdot 0.006$$

Finding Partial Order of H_2O_2

Average Rate of Trial 1: 0.20566 kpa/s

Average Rate of Trial 2: 0.12675 kpa/s

To calculate Partial Order we use:

$$\frac{\text{Rate T2}}{\text{Rate T1}} = \frac{k[H_2O_2]_2^x[catalase]_2^y}{k[H_2O_2]_1^x[catalase]_1^y}$$

$$= \frac{\text{Rate T2}}{\text{Rate T1}} = \frac{[H_2O_2]_2^x}{[H_2O_2]_1^x}$$

$$= \frac{\text{Rate T2}}{\text{Rate T1}} = \left(\frac{[H_2O_2]_2}{[H_2O_2]_1}\right)^x$$

$$x = \log_{\left(\frac{[H_2O_2]_2}{[H_2O_2]_1}\right)} \frac{\text{Rate T2}}{\text{Rate T1}}$$

$$x = \log_{\left(\frac{0.0135}{0.024}\right)} \left(\frac{0.12675}{0.20566}\right)$$

$$x = 0.84$$

Finding Activation Energy of Catalase Reactions

$$\ln\left(\frac{k_2}{k_1}\right) = -\frac{E_a}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

K is directly proportional to initial rate, therefore it can be replaced by the actual initial rate and can be shown as a ratio:

$$\frac{k_2}{K_1} = \frac{\text{Rate T2}}{\text{Rate T1}}$$

Average Rate of Trial 2.1: 0.07977 kpa/s at 299.15 $^\circ C$

Average Rate of Trial 2.2: 0.40119 kpa/s at 304.15 $^\circ C$

$$ln\left(\frac{0.40119}{0.07977}\right) = -\frac{E_a}{R}\left(\frac{1}{304.15} - \frac{1}{299.15}\right)$$

$$1.61528 = -\frac{E_a}{R}(-5.4953 \times 10^{-5})$$

$$29393.84R = E_a$$

$$E_a = 244.262kJ/mol$$

Finding Activation Energy of KI Reactions

$$\ln\left(\frac{k_2}{k_1}\right) = -\frac{E_a}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

Average Rate of Trial 3.1: 0.02682 kpa/s at 303.15 $°C$

Average Rate of Trial 2.2: 0.07084 kpa/s at 308.15 $°C$

$$ln\left(\frac{0.07084}{0.02682}\right) = -\frac{E_a}{R}\left(\frac{1}{308.15} - \frac{1}{303.15}\right)$$

$$0.97128 = -\frac{E_a}{R}\left(-5.35242 \times 10^{-5}\right)$$

$$18146.55R = E_a$$

$$E_a = 150.797kJ/mol$$