# Sample Calculation

In order to perform any further analysis, the concentration of FeCl3 and KI used in each trial needs to be determined. The concentration used for each trial needs to be determined:

\*This calculation was performed for each volume of chemicals used: 0.01, 0.02, 0.025 dm3.

Two tables can then be constructed to summarize the results of the experiment:

Table 1: Reaction rate (mol1dm3-s-1) of varying volume (dm3) and concentration (M) of FeCl reacting with 0.025dm3 of KI

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Volume (dm3) | Concentration  (M) | Trial 1  (mol1dm3-s-1) | Trial 2  (mol1dm3-s-1) | Trial 3  (mol1dm3-s-1) | Trial 4  (mol1dm3-s-1) | Average  (mol1dm3-s-1) |
| 10 | 0.0040 | 0.0016 | N/A | 0.0027 | N/A | 0.0021 |
| 20 | 0.0080 | 0.0030 | N/A | 0.0035 | N/A | 0.0033 |

Table 2: Reaction rate (mol-1dm3s-1) of varying volume (dm3) and concentration (M) of KI reacting with 0.025dm3 of FeCl

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Volume (dm3) | Concentration  (M) | Trial 1  (mol1dm3-s-1) | Trial 2  (mol1dm3-s-1) | Trial 3  (mol1dm3-s-1) | Trial 4  (mol1dm3-s-1) | Average  (mol1dm3-s-1) |
| 10 | 0.0040 | 0.0017 | 0.0030 | 0.0015 | 0.0017 | 0.0020 |
| 20 | 0.0080 | 0.0038 | 0.0075 | 0.0036 | 0.0050 | 0.0050 |

Note: Some of the values in table 1 are missing because some groups did not get a result for their experiment. The average is calculated with the following formula with N representing population size, ri representing the reaction rate measured in the “i”th trial and µ representing the average:

The averages calculated can then be used to determine the order of reaction of that specific chemical in the reaction with n representing the order of reaction, µi and Mi representing the “i”th average and molar concentration:

The rate constant k can now be determined using the order of reaction for each chemical and the rate of reaction measured by each trial:

Table 3: Rate constant (mol-1dm3s-1) calculated for each trial of the experiment with varying concentration (M) of FeCl and KI used to react to each other

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Trial 1 (mol-1dm3s-1) | Trial 2 (mol-1dm3s-1) | Trial 3 (mol-1dm3s-1) | Trial 4 (mol-1dm3s-1) |
| 0.004 M of FeCl and 0.01 M of KI | 40 | N/A | 66 | N/A |
| 0.008 M of FeCl and 0.01 M of KI | 38 | N/A | 44 | N/A |
| 0.004 M of KI and 0.01 M of FeCl | 42 | 75 | 38 | 42 |
| 0.008 M of KI and 0.01 M of FeCl | 47 | 94 | 45 | 62 |

These values are then averaged to calculate the final rate constant of the reaction:

Therefore the rate equation of the reaction will is:

where k = 51 mol-1dm3s-1