To investigate the rate equation of apparatus

To determine the order of reaction of each reactant , I will keep one reactant in excess while changing the concentration of the other . I will place a conical flask on top of a sheet of white paper with a black cross of ink in the centre . The reactants will then be added to the flask (see table below). A total of 70 cm of reactants will be used each time (50 cm of Sodium thiosulphate and 20 cm of HCl) , this will keep the depth of the solution the same each time so that the optical properties of the liquid to not change . Using a burette to make up the desired concentration of sodium thiosulphate diluting with distilled water if required , pipette 50 cm into a conical flask . Pipette 20 cm of HCl into a test tube , pour the contents of the test tube into the conical flask . When the last of the HCl enters the flask I will start a stop watch , recording the amount of time it takes for the sulphur precipite to make the solution opaque therefore being unable to see the cross look from directly above . When this happens I will stop the clock and record the result . For each concentration repeat three times .

Minimising , error and anomalous results

Before using glass equipment I will rinse it with freshly distilled water and then dry it as well as possible . To make up the different concentrations required (see table) I will add distilled water to a sample of the given concentrations . The precipite may stain the flask , to minimise the effect of this I will rinse the flask after each run . I will also monitor temperature as the experiment will be effected by temperature

Risk assesement

Sodium thiosulphate

Wear eye protection – does not produce hazardous products if substance gets in eyes flood with water , if swallowed give plenty of water -seek medical attension

Hydrochloric Acid

Wear eye protection and gloves . If swallowed give water , If liquid gets in eye flood with water . If spilt in lab cover with mineral absordent and clear up ventilate area .

Results

Concentration of sodium thiosulphate mol dm (50 cm)

Concentration of HCl mol dm (2O cm)

Time (seconds)

1st exp

Time

(seconds)

2nd exp

Time

(seconds)

3 rd

Mean time

(seconds)

0. 4

2

28. 41

30. 22

31. 19

29. 94

0. 3

2

44. 66

45. 37

45. 21

45. 08

0. 2

2

55. 88

53. 59

62. 18

57. 22

0. 1

2

88. 13

89. 72

90. 35

89. 40

0. 05

2

104. 40

120. 51

122. 61

115. 84

0. 4

1

60. 32

61. 93

57. 21

59. 82

0. 4

0. 5

90. 40

89. 27

88. 62

89. 43

0. 4

0. 250

120. 32

119. 07

121. 78

120. 39

0. 4

0. 125

150. 66

147. 98

147. 52

148. 72

Analysis

As both graphs have constant half-lifes they are both first order . This makes the overall reaction second order

Evaluation

Source of error

unclean equipment

starting the clock

Degree of cloudiness

measurements from instruments

mixing solution

experimental improvements

colorimeter

light sensor

The determination of a rate equation Assessed Practical