**The Sulfur Clock Reaction**

Like the iodine clock reaction, the sulfur clock reaction occurs in stages, the final step of which causes a visible change. The overall reaction is between thiosulfate ions and acid to form elemental sulfur.

S2O32-(aq) + 2H+(aq) 🡪 S(s) + H2SO3(aq)

As particles of solid form, the solution becomes cloudy and then opaque.

**Question:** i)What is the order of reaction with respect to the sulfate ions? ii)How many sulfate ions are involved in the rate determining step?

Initial Concentration and Reaction Time Data for Sulfur Clock

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| --- | --- | --- | --- |
| Trial | Initial [S2O32-(aq)] (mmol/L) | Initial [H+(aq)] (mol/L) | Time (s) |
| 1 | 0.10 | 0.050 | 83 |
| 2 | 0.20 | 0.050 | 44 |
| 3 | 0.30 | 0.050 | 32 |
| 4 | 0.40 | 0.050 | 23 |
| 5 | 0.50 | 0.050 | 18 |

**Discussion:**

1. Make a qualitative statement to summarize the qualitative observations in the investigations.
2. Make appropriate tables and plot graphs to answer the question i).
3. Write a mathematical expression that shows how the rate of consumption of S2O32-(aq) depends on S2O32-(aq).
4. Answer question ii)

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| **Section** | **Required Elements** | **Marks** |
| Title | * Descriptive Title Given | 1 |
| Question | * Purpose of the lab | 1 |
| Results and Discussion | * Question 1 * Complete Data Table (with rate and concentration) * Graphs are complete with labels and units * Rate Expressions | 1 6  15 4 |
|  | **Total 28** |  |