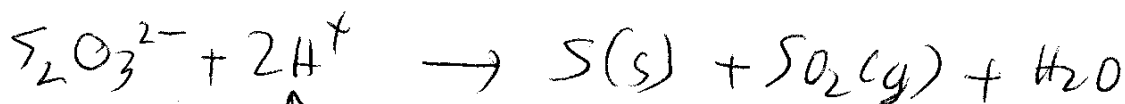


Lab Info: Experiment 20

Kinetics

The Rxn is the same as Rxn #7 in Redox Lab (Lab #18)

net ionic



↑
can write H⁺ as H₃O⁺ with 2 extra H₂O here (as in book)

$$rate = k [S_2O_3^{2-}]^x [H^+]^y$$

but if hold [H⁺] constant

$$rate = k' [S_2O_3^{2-}]^x$$

has [H⁺] constant + k

→ X = order of rate law (not X in plot)

- X = 0 (zero order)
- 1 (1st order)
- or 2 (2nd order)

this expt not looking for (y)

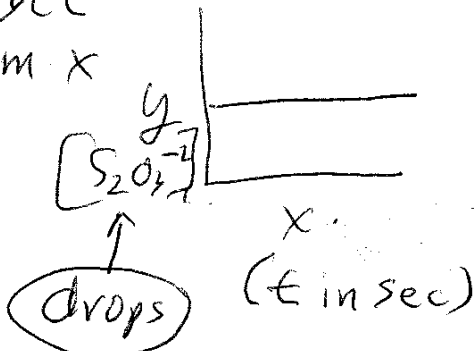
If $\left(\begin{smallmatrix} \text{order} \\ x=0 \end{smallmatrix}\right)$, rate = $k' [S_2O_3^{2-}]^0 = k'$ (page 2)

$$+ [S_2O_3^{2-}]_t = [S_2O_3^{2-}]_0 - kt$$

(y)
b
m x

eqn line = $y = b + mx$
 general

intercept slope

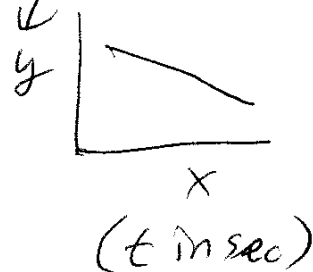


See p. 66 in lab book

If $\left(\begin{smallmatrix} \text{order} \\ x=1 \end{smallmatrix}\right)$, rate = $k' [S_2O_3^{2-}]^1$

$$+ \ln [S_2O_3^{2-}]_t = \ln [S_2O_3^{2-}]_0 - kt$$

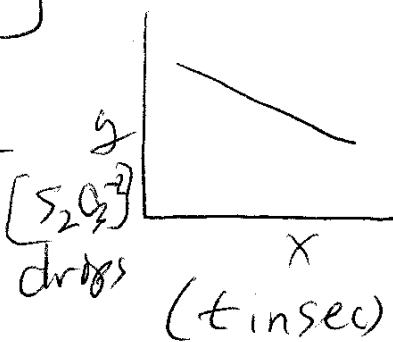
y
b
x



If $\left(\begin{smallmatrix} \text{order} \\ x=2 \end{smallmatrix}\right)$, rate = $k' [S_2O_3^{2-}]^2$

$$+ \left(\frac{1}{[S_2O_3^{2-}]_t}\right) = \left(\frac{1}{[S_2O_3^{2-}]_0}\right) + kt$$

y
intercept
x



these are integrated rate laws

plot + choose best fit

(page 3)

order = zero, first, or second
with respect to $[S_2O_3]$

k is always $(+ \#)$ + is
slope of best line

We can also use comparison method
see p. 63 lab book for simple
Rxn's by inspection (as in examples
in lecture) or

$$\text{equation order} = \frac{\log \left(\frac{\text{rate}_1}{\text{rate}_2} \right)}{\log \left(\frac{\text{concentration}_1}{\text{concentration}_2} \right)}$$

where you choose rate 1 + rate 2
for change only in one
concentration (like in the
simple inspection method)
(try the simple inspection method)
does not answer lab question