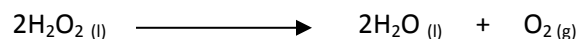


## CHEMICAL KINETICS

S.6 SEPT. 2012

### **Kinetic studies on the catalytic decomposition of hydrogenperoxide using potassiummanganate(VII) solution.**

Hydrogenperoxide decomposes catalytically according to the following equation:



The rate of decomposition of hydrogenperoxide can be followed by determining the concentration of hydrogenperoxide present at specified time intervals.

You are provided with the following solutions:

FA1, which is Hydrogenperoxide solution

FA2, which is Borate buffer

FA3, which is 0.01M Potassiummanganate(VII) solution

FA4, which is 1M Sulphuric acid

#### **PROCEDURE:**

Mix 20cm<sup>3</sup> of FA1 and 100cm<sup>3</sup> of FA2 in a conical flask and shake thoroughly. Run 10cm<sup>3</sup> of FA3 from the burette into the mixture and start the stop clock after all the FA3 has been added.

The borate buffer reacts with the manganate(VII) ions to form manganese(IV)oxide which catalyses the decomposition of hydrogenperoxide.

At exactly 2 minutes after addition of FA3, withdraw 10cm<sup>3</sup> of the mixture and run it into 15cm<sup>3</sup> of FA4 in another conical flask. Immediately titrate with FA3 and note the volume of FA3 corresponding to 2 minutes,  $V_{t2}$ ; which is required to reach the endpoint.

Withdraw further 10cm<sup>3</sup> portions of the mixture at 5 minute intervals and treat them similarly. Note the volumes of FA3,  $V_{t7}$ ;  $V_{t12}$ ;  $V_{t17}$ ;  $V_{t22}$ ; e.t.c which is required to reach the endpoint.

The sulphuric acid destroys the manganese (IV) oxide making further decomposition of hydrogenperoxide very slow which enables determination of the concentration of hydrogenperoxide present at that time.

Record your results in the table below:

Expt.	Time/S	Burette readings(cm <sup>3</sup> )		Volume used (cm <sup>3</sup> )	
		Final reading	Initial reading		
1				V <sub>t2</sub>	
2				V <sub>t7</sub>	
3				V <sub>t12</sub>	
4				V <sub>t17</sub>	
5				V <sub>t22</sub>	
6				V <sub>t27</sub>	
7				V <sub>t32</sub>	

**Questions:**

- a) Plot a graph of volume used against time.
  
  
  
  
  
  
  
  
  
  
- b) Deduce the order of reaction with respect to hydrogenperoxide.
  
  
  
  
  
  
  
  
  
  
- c) What does the order of reaction imply about the rate of decomposition of hydrogenperoxide?