

## Rates of Reaction Worksheet

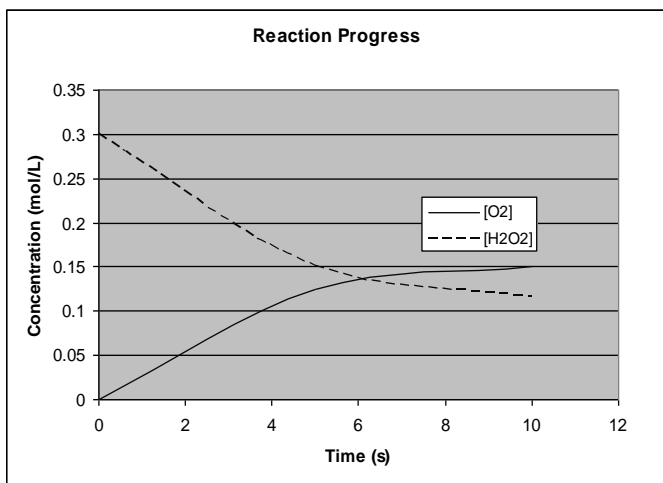
- 1) Solid phosphorus and oxygen gas react to form tetraphosphorus decoxide. Determine the average rate of reaction for oxygen during the first 40 s if the concentration changes from 0.200 mol/L to 0.0001 mol/L during this time interval.



- 2) At 40°C, hydrogen chloride gas will form from the reaction of gaseous hydrogen and chlorine, according to the following balanced chemical equation:  $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$ . Using the data provided, calculate the following average rates:

Time (s)	Concentration (mol/L)		
	H <sub>2</sub> (g)	Cl <sub>2</sub> (g)	HCl (g)
0	1.000	1.000	0.000
2.16	0.500	0.500	1.000
4.32	0.250	0.250	1.500

- a) hydrogen gas in the first 2.16 s.  
 b) hydrogen chloride gas in the first 4.32 s  
 c) chlorine gas between 2.16 s & 4.32 s  
 d) hydrogen gas in the first 4.32 s
- 3) Hydrogen peroxide in aqueous solution will decompose to produce oxygen gas and water. Use the graph to:



- a) Calculate the average reaction rate of hydrogen peroxide between 0 s and 5 s.  
 b) Calculate the average reaction rate for the oxygen gas between 0 s and 2 s.  
 c) Calculate the average reaction rate for the oxygen gas between 2 s and 4 s.  
 d) Calculate the average reaction rate for the oxygen gas between 4 s and 6 s.  
 e) Calculate the average reaction rate for the oxygen gas between 6 s and 8 s.  
 f) Using your answers for 3b-3e, is the rate of a reaction a constant value from start to finish? Why do you think it is or isn't a constant value? What is causing the rate to stay the same or change?

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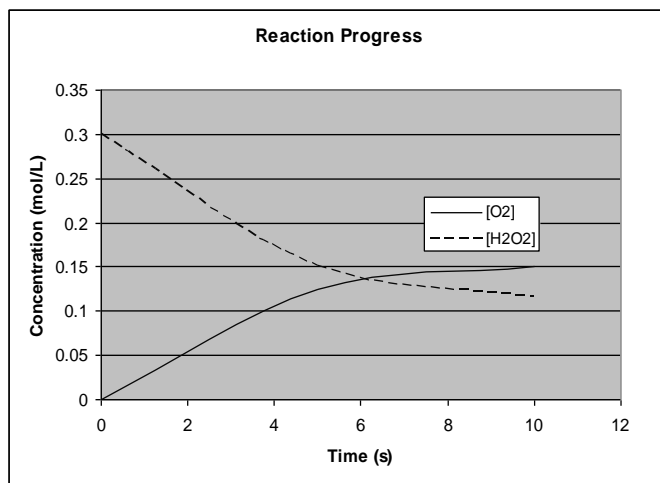
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