

CONCEPT: AVERAGE RATE OF REACTION

- **Average (General) Rate:** change in concentration (M) of a reactant or product over a period of time.

□ Change in concentrations: reactant is _____ while product is _____.

- *Note:* As reaction proceeds, reactants are _____ and products are _____.

Average Rate of Reaction

$$\text{Average Rate} = - \frac{\Delta [\text{reactant}]}{a \Delta \text{time}} = + \frac{\Delta [\text{product}]}{b \Delta \text{time}}$$

□ [] = concentration (M) of reactant & product

□ $\Delta [] = []_{\text{final}} - []_{\text{initial}}$

□ a, b = stoichiometric coefficients

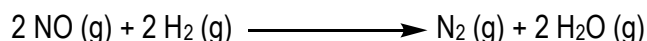
□ $\Delta \text{time} = t_{\text{final}} - t_{\text{initial}}$

EXAMPLE: Provide the expressions for rate of disappearance of reactants and rate of appearance of products for the following reaction: $2 \text{C}_3\text{H}_7\text{OH} (\text{l}) + 9 \text{O}_2 (\text{g}) \longrightarrow 6 \text{CO}_2 (\text{g}) + 8 \text{H}_2\text{O} (\text{g})$

Average Rate Calculations

- Knowing how to write expressions for the rate of reaction will help to perform calculations for various time intervals.

EXAMPLE: Calculate the average rate of change in concentration of NO in the first 5 seconds of the reaction if the concentration dropped from 1.3 M to 1.09 M.



PRACTICE: Consider the following reaction: $2 \text{H}_2\text{O}_2 (\text{aq}) \longrightarrow 2 \text{H}_2\text{O} (\text{l}) + \text{O}_2 (\text{g})$

Calculate the rate of the reaction between 25 sec and 65 sec.

Time (sec)	[H ₂ O] (M)
0.0	0.0
15	0.45
25	1.30
40	1.94
65	2.02