

## Relative Rates

Sunday, February 24, 2019 8:46 AM

**Relative Rates** (Stoichiometric Relationship) - Mole ratio = coefficients

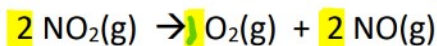
$$\frac{\Delta [ ]}{\Delta t}$$

\* Reactants = Negative sign

\* Products = positive sign

\* Fraction =  $\frac{1}{\text{Coefficient}}$   
Make

4. For the reaction below, the initial rate of formation of NO(g) is  $0.60 \text{ M s}^{-1}$ .

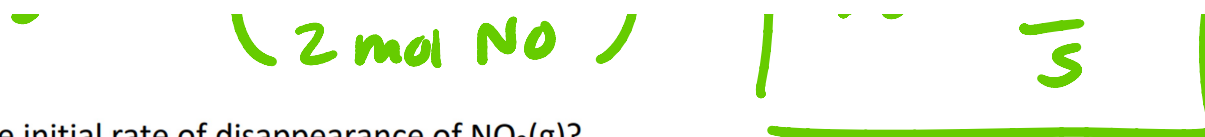


a) Write the relative rates of change in concentrations of the reactants and products.

$$-\underbrace{\left(\frac{1}{2}\right)}_{\text{Half}} \frac{\Delta [\text{NO}_2]}{\Delta t} = \boxed{+\left(\frac{1}{1}\right) \frac{\Delta [\text{O}_2]}{\Delta t}} = +\underbrace{\left(\frac{1}{2}\right)}_{\text{Half}} \frac{\Delta [\text{NO}]}{\Delta t}$$

b) What is the initial rate of formation of  $\text{O}_2(\text{g})$ ?

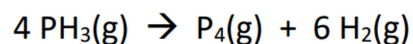
$$0.60 \frac{\text{M}}{\text{s}} \text{ NO } \left( \frac{1 \text{ mol O}_2}{2 \text{ mol NO}} \right) = \boxed{0.30 \frac{\text{M}}{\text{s}}}$$



c) What is the initial rate of disappearance of  $\text{NO}_2(\text{g})$ ?

$$0.60 \frac{\text{M}}{\text{s}} \text{ NO} \left( \frac{2 \text{ mol NO}_2}{2 \text{ mol NO}} \right) = \boxed{0.60 \frac{\text{M}}{\text{s}}}$$

5. For the reaction below, the initial rate of consumption of  $\text{PH}_3(\text{g})$  is  $1.33 \times 10^{-3} \text{ M min}^{-1}$ .



a) Calculate the initial rate of formation of  $\text{P}_4(\text{g})$ .

$$1.33 \times 10^{-3} \frac{\text{M}}{\text{min}} \text{ PH}_3 \left( \frac{1 \text{ mol P}_4}{4 \text{ mol PH}_3} \right) = \boxed{3.33 \times 10^{-4} \frac{\text{M}}{\text{min}}}$$

b) Calculate the initial rate of formation of  $\text{H}_2(\text{g})$ .

$$1.33 \times 10^{-3} \frac{\text{M}}{\text{min}} \text{ PH}_3 \left( \frac{6 \text{ mol H}_2}{4 \text{ mol PH}_3} \right) = \boxed{2.00 \times 10^{-3} \frac{\text{M}}{\text{min}}}$$

min

~ 4 mol  $\text{PH}_3$  /

min