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 M s⁻¹.

$$2\,NO_2(g) \rightarrow 1\,O_2(g) + 2\,NO(g)$$

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

$$-\left(\frac{1}{2}\right)\frac{\Delta[NO_2]}{\Delta t} = +\left(\frac{1}{1}\right)\frac{\Delta[O_2]}{\Delta t} = +\left(\frac{1}{2}\right)\frac{\Delta[NO]}{\Delta t}$$

Half Half

b) What is the initial rate of formation of O_2(g)?

$$0.60\,\frac{M}{s}\,NO\left(\frac{1\text{ mol }O_2}{2\text{ mol }NO}\right) = 0.30\,\frac{M}{s}$$

$$\left(\frac{}{2\ mol\ NO}\right) \quad \boxed{\frac{}{s}}$$

c) What is the initial rate of disappearance of $NO_2(g)$?

$$0.60\ \frac{M}{s}\ NO\left(\frac{2\ mol\ NO_2}{2\ mol\ NO}\right) = \boxed{0.60\ \frac{M}{s}}$$

5. For the reaction below, the initial rate of consumption (used) of $PH_3(g)$ is 1.33×10^{-3} M min^{-1}.

$$4\ PH_3(g) \rightarrow P_4(g) + 6\ H_2(g)$$

a) Calculate the initial rate of formation of $P_4(g)$.

$$1.33 \times 10^{-3}\ \frac{M}{min}\ PH_3\left(\frac{1\ mol\ P_4}{4\ mol\ PH_3}\right) = \boxed{3.33 \times 10^{-4}\ \frac{M}{min}}$$

b) Calculate the initial rate of formation of $H_2(g)$.

$$1.33 \times 10^{-3}\ \frac{M}{min}\ PH_3\left(\frac{6\ mol\ H_2}{4\ mol\ PH_3}\right) = \boxed{2.00 \times 10^{-3}\ \frac{M}{min}}$$

(4 mol PH_3)

min