

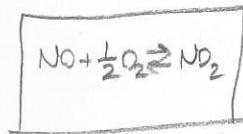
basis: 100 mol NO

(32)

$n_{O_2}^{in}$
 $n_{N_2}^{in}$
 n_{NO}^{in}

21 mol

7 mol



$$\begin{aligned} n_{NO}^{out} &= 100 - \xi \\ n_{NO_2}^{out} &= \xi \\ n_{N_2}^{out} &= n_{N_2}^{in} \\ n_{O_2}^{out} &= n_{O_2}^{in} - \frac{1}{2} \xi \end{aligned}$$

$P = 1.0133 \text{ bar}$

$$C_{NO} + C_{NO_2} = 5 \text{ ppm}$$

$$C_{NO} = ?$$

$$C = \frac{n_i}{n_{total}}$$

$$P_i = \frac{P_{total} C_i}{1,000,000}$$

$$K = \frac{Y_{NO_2}}{Y_{NO} Y_{O_2}^{1/2}} \cdot \frac{1}{P^{1/2}}$$

$$n_i^{in} = n_i^{out} + n_i^{reacted}$$

$$NO_2: 0 = n_{NO_2}^{out} - \xi$$

$$\xi = n_{NO_2}^{out}$$

$$N_2: n_{N_2}^{in} = n_{N_2}^{out}$$

$$NO: 100 - \xi = n_{NO}^{out}$$

$$O_2: n_{O_2}^{in} - \frac{1}{2} \xi = n_{O_2}^{out}$$

$$C_{NO} = 5 - \frac{n_{NO_2}}{n_{total}}$$

$$\frac{100 - \xi}{n_{total}} = 5 - \frac{\xi}{n_{total}}$$

$$100 - \xi = 5 n_{total} \quad \text{---}$$

$$n_{total} = 20 \text{ moles}$$

$$P_{NO} + P_{NO_2} = \frac{1.01333(5)}{1 \times 10^6}$$

$$P_{NO} + P_{NO_2} = 5.07 \times 10^{-6} \text{ bar}$$

$$C_{NO} = \frac{n_{NO}}{n_{total}}$$

$$C_{NO} + C_{NO_2} = \frac{n_{NO} + n_{NO_2}}{n_{total}} = \frac{5}{1 \times 10^6}$$

$$P_{NO} V = (100 - \xi) RT$$

$$P_{NO_2} V = \xi RT$$

$$P_{total} V = n_{total} RT$$

$$\frac{P_{NO}}{P_{NO_2}} = \frac{100 - \xi}{\xi}$$

$$P_{NO} = \frac{100 - \xi}{\xi} P_{NO_2}$$

$$C_{NO_2} = \frac{\xi}{1 \times 10^6}$$

$$C_{NO} = \frac{100 - \xi}{1 \times 10^6}$$

$$\frac{\xi + 100 - \xi}{n_{total}} = \frac{5}{1 \times 10^6}$$

$$\frac{100 - \xi}{\xi} P_{NO_2} + \frac{\xi}{\xi} P_{NO_2} = 5.06665 \times 10^{-6}$$

$$\frac{100}{\xi} P_{NO_2} = 5.06665 \times 10^{-6}$$

$$\frac{P_{NO_2}}{P_{total}} = \frac{\xi}{n_{total}}$$

$$\frac{P_{NO_2}}{1.0133} = \frac{\xi}{n_{total}}$$

$$\frac{100 - \xi}{20} + \frac{\xi}{20} = \frac{n}{20}$$