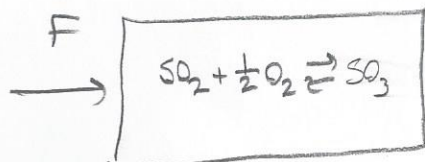


(31) basis: 100 mol

15 mol 15% SO_2
 20 mol 20% O_2
 65 mol 65% N_2



$P = 1 \text{ bar}$
 $T = 480^\circ\text{C}$
 $\text{SO}_2 \quad 15 - \xi$
 $\text{O}_2 \quad 20 - \frac{1}{2}\xi$
 $\text{N}_2 \quad 65 \text{ mol}$
 $\text{SO}_3 \quad \xi$

$K = 87.824 \text{ at } 480^\circ\text{C}$

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

$$\text{SO}_2: 15 - \xi = n_{\text{SO}_2}^P$$

$$\text{O}_2: 20 - \frac{1}{2}\xi = n_{\text{O}_2}^P$$

$$\text{SO}_3: \xi = n_{\text{SO}_3}^P$$

$$n_{\text{total}}^{\text{out}} = 100 - \frac{1}{2}\xi$$

$$\xi = \frac{15 X_A}{-(-1)}$$

$$K = \frac{Y_{\text{SO}_3}}{Y_{\text{SO}_2} Y_{\text{O}_2}^{1/2}} = 87.824$$

$$X_{\text{SO}_2} = 1 - \frac{n_{\text{SO}_2}^{\text{out}}}{n_{\text{SO}_2}^{\text{in}}} = 1 - \frac{15 - \xi}{15} = 1 - \left(1 - \frac{\xi}{15}\right) = \frac{\xi}{15}$$

$$87.824 = \frac{\left(\frac{\xi}{100 - \frac{1}{2}\xi}\right)}{\left(\frac{15 - \xi}{100 - \frac{1}{2}\xi}\right) \left(\frac{20 - \frac{1}{2}\xi}{100 - \frac{1}{2}\xi}\right)^{1/2}}$$

$$\frac{\xi(100 - \frac{1}{2}\xi)^{1/2}}{(15 - \xi)(20 - \frac{1}{2}\xi)^{1/2}} - 87.824 = 0$$

$$0 \leq x \leq 1$$

$$0 \leq \xi \leq 15$$