

$$Q_{\text{m,sv}} = 9394,02 \frac{\text{kg}}{\text{h}}$$

#  $\text{FeS}_2 \rightarrow$  pirita

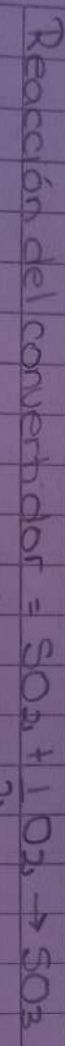
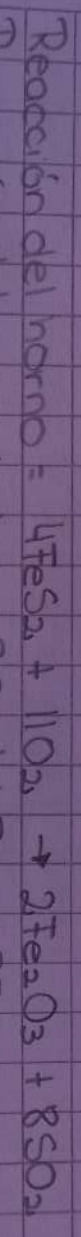
100% exceso de aire.

$T_1 = 673\text{K}$

20%  $\text{SO}_2 \rightarrow \text{SO}_3$

base cálculo  $4 \text{ kmol FeS}_2$

$T_2 = ?$



$4 \text{ kmol FeS}_2 \rightarrow 2,2 \text{ kmol O}_2$  (7 por 100% exceso)

$8,2 \text{ kmol N}_2$  — 21% oxígeno aire

$2 \text{ kmol Fe}_2\text{O}_3$  — 79% nitrógeno aire.

$8 \text{ kmol SO}_2$

Sale horno y entra al convertidor

$\text{SO}_2 \rightarrow 8 \text{ kmol}$

$\text{O}_2 \rightarrow 11 \text{ kmol}$

$\text{N}_2 \rightarrow 83 \text{ kmol}$

} caudales molares

Salida del convertidor

SO<sub>2</sub> → 1,6 kmol → 20% de 8 kmol SO<sub>2</sub>  
SO<sub>3</sub> → 6,4 kmol → 80% de 8 kmol SO<sub>2</sub>  
O<sub>2</sub> → 7,8 kmol → 6,4/2 = 3,2 → 11-3,2 = 7,8  
N<sub>2</sub> → 83 kmol → gas inerte

Balance entrálpico

$$\sum Q_{m, salen} C_{p, salen} (T_2 - T_{ref}) - \sum Q_{m, entra} C_{p, entra} (T_1 - T_{ref}) + Q_{m, SO_2} (\sum \Delta H_{prod} - \sum H_{react}) = Q$$

Salida

$$\left[ \sum Q_{m, SO_2} C_{p, SO_2} + Q_{m, SO_3} C_{p, SO_3} + Q_{m, O_2} C_{p, O_2} + Q_{m, N_2} C_{p, N_2} \right] (T_2 - T_{ref}) =$$

$$\left[ 1,6 \times 10^3 \text{ mol} \cdot \frac{45,6 \text{ J}}{\text{mol} \cdot \text{K}} + 6,4 \times 10^3 \text{ mol} \cdot \frac{63,6 \text{ J}}{\text{mol} \cdot \text{K}} + 7,8 \times 10^3 \text{ mol} \cdot \frac{31 \text{ J}}{\text{mol} \cdot \text{K}} + 83 \times 10^3 \text{ mol} \cdot \frac{29,7 \text{ J}}{\text{mol} \cdot \text{K}} \right] (T_2 - 298 \text{ K}) = 3186900 \frac{\text{J}}{\text{K}} (T_2 - 298 \text{ K}) = 3186900 \frac{\text{J}}{\text{K}} (T_2 - 298 \text{ K}) - 9496902 \times 10^6 \text{ J}$$

Entrada

$$\left[ \sum Q_{m, SO_2} C_{p, SO_2} + Q_{m, O_2} C_{p, O_2} + Q_{m, N_2} C_{p, N_2} \right] (T_1 - T_{ref})$$

$$\left[ 8 \times 10^3 \text{ mol} \cdot \frac{45,6 \text{ J}}{\text{mol} \cdot \text{K}} + 11 \times 10^3 \text{ mol} \cdot \frac{31 \text{ J}}{\text{mol} \cdot \text{K}} + 83 \times 10^3 \text{ mol} \cdot \frac{29,7 \text{ J}}{\text{mol} \cdot \text{K}} \right] (673 \text{ K} - 298 \text{ K})$$

$$3170900 \frac{\text{J}}{\text{K}} (375 \text{ K}) = 1189,0875 \times 10^6 \text{ J}$$

Entalpía productos

$$\sum \Delta H_{SO_2} + \Delta H_{SO_3} + \Delta H_{O_2} + \Delta H_{N_2}$$

$$-296800 - 394900 + 0 + 0 = -691700 \frac{\text{J}}{\text{mol}}$$

Entalpía reactivos

$$\sum \Delta H_{SO_2} + \Delta H_{O_2} + \Delta H_{N_2} =$$

$$= -296800 \frac{\text{J}}{\text{mol}}$$

$$Q_{m, SO_2} (\sum \Delta H_{productos} - \sum \Delta H_{reactivos})$$

$$6,4 \times 10^3 \text{ mol} \left( \frac{-691700 \text{ J}}{\text{mol}} + \frac{296800 \text{ J}}{\text{mol}} \right)$$

$$6,4 \times 10^3 \text{ mol} \left( \frac{-394900 \text{ J}}{\text{mol}} \right) = -2527,36 \times 10^6 \text{ J}$$

Reemplazo todas los valores en (1)

$$3,1869 \times 10^6 \frac{\text{J}}{\text{K}} T_2 - 949,6962 \times 10^6 \text{J} - (1189,0875 \times 10^6 \text{J}) + (-2527,36 \times 10^6 \text{J}) = 0 \text{J}$$

$$3,1869 \times 10^6 \frac{\text{J}}{\text{K}} T_2 = 949,6962 \times 10^6 \text{J} + 1189,0875 \times 10^6 \text{J} + 2527,36 \times 10^6 \text{J}$$

$$3,1869 \times 10^6 \frac{\text{J}}{\text{K}} T_2 = 4666,1437 \times 10^6 \text{J}$$

$$T_2 = \frac{4666,1437 \times 10^6 \text{J}}{3,1869 \times 10^6 \frac{\text{J}}{\text{K}}}$$

$$T_2 = 1464,2 \text{ K}$$