

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

$\text{FeS}_2 \rightarrow$ pirita

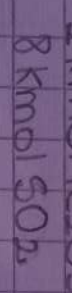
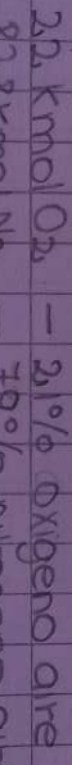
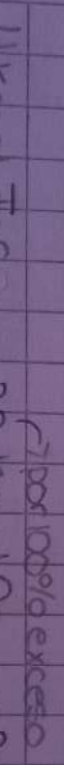
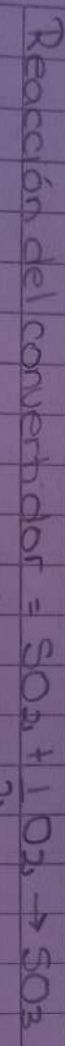
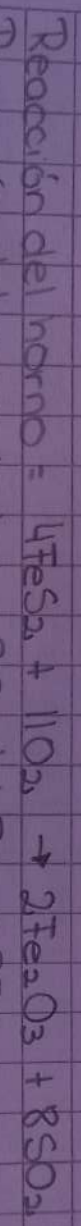
100% exceso de aire.

$T_1 = 673\text{K}$

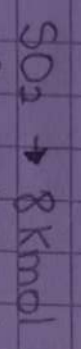
20% $\text{SO}_2 \rightarrow \text{SO}_3$

base cálculo 4 kmol FeS_2

$T_2 = ?$



Salen horno y entran al convertidor



} caudales molares

Salida del convertidor

- SO₂ → 1,6 kmol → 20% de 8 kmol SO₂
- SO₃ → 6,4 kmol → 80% de 8 kmol SO₂
- O₂ → 7,8 kmol → 6,4/2 = 3,2 → 11-3,2 = 7,8
- N₂ → 83 kmol → gas inerte

Balance entrálpico

$$\sum Q_{m, salen} C_{p, salen} (T_2 - T_{ref}) - \sum Q_{m, entra} C_{p, entra} (T_1 - T_{ref}) + Q_{mSO_2} (\sum \Delta H_{prod} - \sum H_{react}) = Q$$

Salida

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

$$\left[1,6 \times 10^3 \text{ mol} \cdot 45,6 \frac{\text{J}}{\text{mol} \cdot \text{K}} + 6,4 \times 10^3 \text{ mol} \cdot 63,6 \frac{\text{J}}{\text{mol} \cdot \text{K}} + 7,8 \times 10^3 \text{ mol} \cdot 31 \frac{\text{J}}{\text{mol} \cdot \text{K}} + 83 \times 10^3 \text{ mol} \cdot 29,7 \frac{\text{J}}{\text{mol} \cdot \text{K}} \right] (T_2 - 298 \text{ K}) = 3186900 \frac{\text{J}}{\text{K}} (T_2 - 298 \text{ K}) = 3186900 \frac{\text{J}}{\text{K}} T_2 - 949 \times 10^6 \text{ J}$$

Entrada

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

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

$$3170900 \frac{\text{J}}{\text{K}} (375 \text{ K}) = 89,0875 \times 10^6 \text{ J}$$

Entalpía productos

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

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

Entalpía reactivos

$$\sum \Delta H_{f, SO_2} + \Delta H_{f, O_2} + \Delta H_{f, N_2}$$

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

$$Q_{mSO_2} (\sum \Delta H_{productos} - \sum \Delta H_{reactivos})$$

$$\Delta H_R^\circ = -\sum H_{f, R}^\circ + \sum H_{f, P}^\circ$$

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

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

$$\Delta H_R^T = \sum_R m_R \bar{c}_{pR} (25 - T) + \Delta H_R^0 + \sum_P m_P \bar{c}_{pP} (T - 25)$$

Reemplazo todos los valores en (1)

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

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

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

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

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