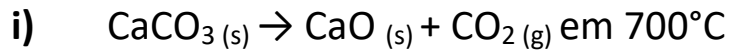


Lista Complementar – Termodinâmica de Materiais

Loop Termodinâmico

1. Determine o ΔH final das reações abaixo nas temperaturas indicadas, e informe se a reação é endotérmica ou exotérmica. Considere para todas as reações $n=1$ mol.

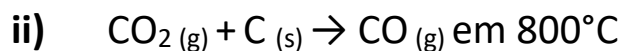


Dados: $\Delta_f H^\circ_{298K} (\text{CaCO}_3 (s)) = -1206,7 \text{ kJ/mol}$; $\Delta_f H^\circ_{298K} (\text{CaO} (s)) = -633,88 \text{ kJ/mol}$; $\Delta_f H^\circ_{298K} (\text{CO}_2 (g)) = -393,51 \text{ kJ/mol}$

$$C_{p,m} (\text{CaCO}_3 (s)) = 99,715 + 26,92 \times 10^{-3} \cdot (T) - 215,76 \times 10^4 \cdot (T)^{-2} \text{ J/mol.K}$$

$$C_{p,m} (\text{CaO} (s)) = 49,954 + 4,888 \times 10^{-3} \cdot (T) - 0,35 \times 10^4 (T)^{-2} \text{ J/mol.K}$$

$$C_{p,m} (\text{CO}_2 (g)) = 87,82 - 2,6442 \times 10^{-3} \cdot (T) - 9,9886 \times 10^2 \cdot (T)^{-0,5} + 70,641 \times 10^4 \cdot (T)^{-2} \text{ J/mol.K}$$

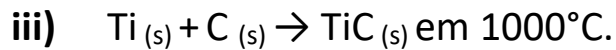


Dados: $\Delta_f H^\circ_{298K} (\text{CO}_2 (g)) = -393,51 \text{ kJ/mol}$; $\Delta_f H^\circ_{298K} (\text{CO} (g)) = -110,53 \text{ kJ/mol}$;

$$C_{p,m} (\text{CO}_2 (g)) = 87,82 - 2,6442 \times 10^{-3} \cdot (T) - 9,9886 \times 10^2 \cdot (T)^{-0,5} + 70,641 \times 10^4 \cdot (T)^{-2} \text{ J/mol.K}$$

$$C_{p,m} (\text{C} (s)) = 17,15 + 4,27 \times 10^{-3} \cdot (T) - 8,79 \times 10^5 (T)^{-2} \text{ J/mol.K}$$

$$C_{p,m} (\text{CO} (g)) = 25,57 + 6,096 \times 10^{-3} \cdot (T) + 4,055 \times 10^5 \cdot (T)^{-2} \text{ J/mol.K}$$



Dados: $\Delta_f H^\circ_{298\text{K}} (\text{TiC}_{(s)}) = -183,70 \text{ kJ/mol}$

$T_{\alpha \rightarrow \beta} = 1115\text{K}$

$\Delta H_{\alpha \rightarrow \beta} = 3,473 \text{ kJ/mol}$

$C_{p,m} (\alpha\text{-Ti}_{(g)}) = 22,09 + 10,04 \times 10^{-3} \cdot (T) \text{ J/mol.K}$

$C_{p,m} (\beta\text{-Ti}_{(g)}) = 28,91 \text{ J/mol.K}$

$C_{p,m} (\text{C}_{(s)}) = 17,15 + 4,27 \times 10^{-3} \cdot (T) - 8,79 \times 10^5 (T)^{-2} \text{ J/mol.K}$

$C_{p,m} (\text{TiC}_{(s)}) = 49,50 + 3,35 \times 10^{-3} \cdot (T) - 14,98 \times 10^5 \cdot (T)^{-2} \text{ J/mol.K}$



Dados: $\Delta_f H^\circ_{298\text{K}} (\text{Mg}(\text{OH})_{2(s)}) = -925,5 \text{ kJ/mol}$; $\Delta_f H^\circ_{298\text{K}} (\text{MgO}_{(s)}) = -601,3 \text{ kJ/mol}$; $\Delta_f H^\circ_{298\text{K}} (\text{H}_2\text{O}_{(l)}) = -241,8 \text{ kJ/mol}$

H_2O : $T_{l \rightarrow v} = 100^\circ\text{C}$.

$\Delta H_{l \rightarrow v} = -285,8 \text{ kJ/mol}$

$C_{p,m} (\text{Mg}(\text{OH})_{2(s)}) = 158,40 - 4,076 \times 10^{-3} \cdot (T) - 10,523 \times 10^5 \cdot (T)^{-2} - 1,1713 \times 10^3 \cdot (T)^{-0,5} \text{ J/mol.K}$

$C_{p,m} (\text{MgO}_{(s)}) = 42,59 - 7,28 \times 10^{-3} \cdot (T) - 6,19 \times 10^5 \cdot (T)^{-2} \text{ J/mol.K}$

$C_{p,m} (\text{H}_2\text{O}_{(l)}) = 75,44 \text{ J/mol.K}$

$C_{p,m} (\text{H}_2\text{O}_{(v)}) = 30,00 - 10,71 \times 10^{-3} \cdot (T) + 0,33 \times 10^5 \cdot (T)^{-2} \text{ J/mol.K}$



Dados: $\Delta_f H^\circ_{298\text{K}} (\text{MoS}_2 (\text{s})) = -925,5 \text{ kJ/mol}$; $\Delta_f H^\circ_{298\text{K}} (\text{MoO}_3 (\text{s})) = -745,17 \text{ kJ/mol}$; $\Delta_f H^\circ_{298\text{K}} (\text{SO}_2 (\text{g})) = -297,0 \text{ kJ/mol}$

$$C_p (\text{MoS}_2 (\text{s})) = 68,56 + 15,59 \times 10^{-3} \cdot (T) - 8,65 \times 10^5 \cdot (T)^{-2} \text{ J/mol.K}$$

$$C_p (\text{O}_2 (\text{g})) = 48,318 - 0,6913 \times 10^{-3} \cdot (T) - 4,202 \times 10^2 \cdot (T)^{-0,5} + 49,923 \times 10^4 \cdot (T)^{-2} \text{ J/mol.K}$$

$$C_p (\text{SO}_2 (\text{g})) = 21,43 + 74,35 \times 10^{-3} (T) - 0,0867 \times 10^4 (T)^{-2} \text{ J/mol.K}$$

$$C_p (\text{MoO}_3 (\text{s})) = 93,31 - 22,81 \times 10^{-3} (T) + 1,41 \times 10^4 (T)^{-2} \text{ J/mol.K}$$