

مقرر 3 / حساب التغير في الإنتروبي في الحالة القياسية

لدينا التفاعل التالي: $2 \text{Al}(s) + \frac{3}{2} \text{O}_2(g) \longrightarrow \text{Al}_2\text{O}_3(s)$

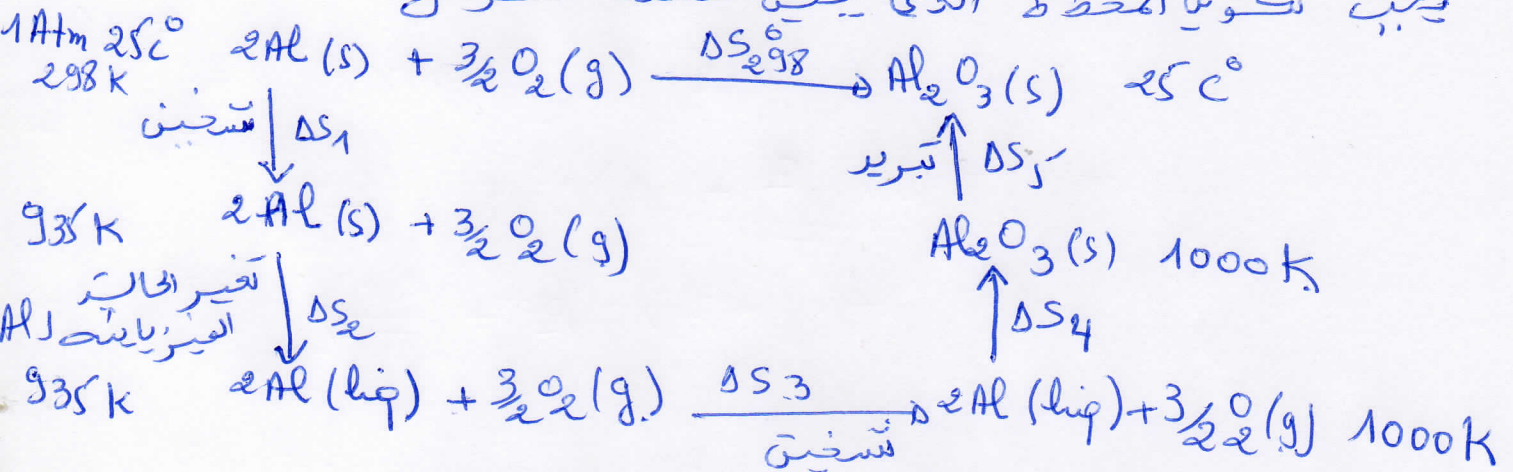
$$\Delta S_{298}^\circ = \sum S_{\text{الناتج}}^\circ - \sum S_{\text{المتفاعلات}}^\circ = S^\circ(\text{Al}_2\text{O}_3)_s - 2S^\circ(\text{Al})_s - \frac{3}{2}S^\circ(\text{O}_2)_g$$

$$= 12,2 - 2 \times 6,8 - \frac{3}{2} \times 49 = -47,9 \text{ cal/K}$$

$$\Delta S_{298}^\circ = -47,9 \text{ cal/K}$$

2 / حساب الإنتروبي عند 1000K

يجب تكوين المخطط الذي يبين مختلف المراحل



- بتطبيق قانون Hess:

$$\Delta S_{298}^\circ = \Delta S_T = \sum_{i=1} \Delta S_i = \Delta S_1 + \Delta S_2 + \Delta S_3 + \Delta S_4 + \Delta S_5$$

$$\Delta S_4 = \Delta S_{298}^\circ - \Delta S_1 - \Delta S_2 - \Delta S_3 - \Delta S_5$$

$$\Delta S_1 = \Delta S'(\text{Al})_s + \Delta S'(\text{O}_2)_g = [n_{\text{CP}}(\text{Al})_s + n_{\text{CP}}(\text{O}_2)_g] \ln \frac{935}{298}$$

$$= (2 \times 6,7 + \frac{3}{2} \times 7,5) \ln \frac{935}{298} \Rightarrow \Delta S_1 = 28,1 \text{ cal/K}$$

$$\Delta S_2 = \frac{n \Delta H_{\text{fus}}(\text{Al})}{T_{\text{fus}}} = \frac{2 \times 2,5 \times 10^3}{935} = 5,36 \Rightarrow \Delta S_2 = 5,36 \text{ cal/K}$$

$$\Delta S_3 = [n_{\text{CP}}(\text{Al}, l) + n_{\text{CP}}(\text{O}_2, g)] \ln \frac{1000}{935} = (2 \times 7 + \frac{3}{2} \times 7,5) \ln \frac{1000}{935}$$

$$\Delta S_3 = 1,778 \text{ cal/K}$$

$$\Delta S_5 = n_{\text{CP}}(\text{Al}_2\text{O}_3)_s \ln \frac{298}{1000} = 1 \times 29 \ln \frac{298}{1000}$$

$$\Delta S_5 = -35,11 \text{ cal/K}$$

$$\Rightarrow \Delta S_4 = -47,9 - 28,1 - 5,36 - 1,778 + 35,11$$

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