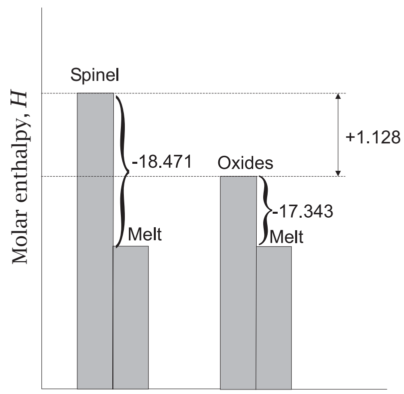


Figure 1: Why Mg_2SnO_4 has a positive enthalpy of formation from the oxides. A variation of Figure 5.3 (but note the comment on Figure 5.3 in the "Corrections" file).

Chapter 5 Answers

Answers for questions 3,4,5, 8 and 9 are in the spreadsheet ans_chap_5.xls.

6. Two diagrams for this question are attached.
7. At 695°C (968 K) $\Delta_r H^\circ = -1668\,\text{cal mol}^{-1}$.
   $\Delta_{transition} H = 290\,\text{cal mol}^{-1}$
10. (a)

$$\begin{aligned} \Delta_f H^\circ_{\mathrm{Mg_2SnO_4}} &= +1.128\,\text{kJ mol}^{-1} \\ \Delta_f H^\circ_{\mathrm{Co_2SnO_4}} &= -2.317\,\text{kJ mol}^{-1} \end{aligned}$$

   where in this case $\Delta_f H^\circ$ means formation from the oxides, not from the elements. See Figure 1 about the sign.

   (b) You would need $\Delta_f H^\circ$ for each compound, where $\Delta_f H^\circ$ has its usual meaning of formation from the elements.

   (c)

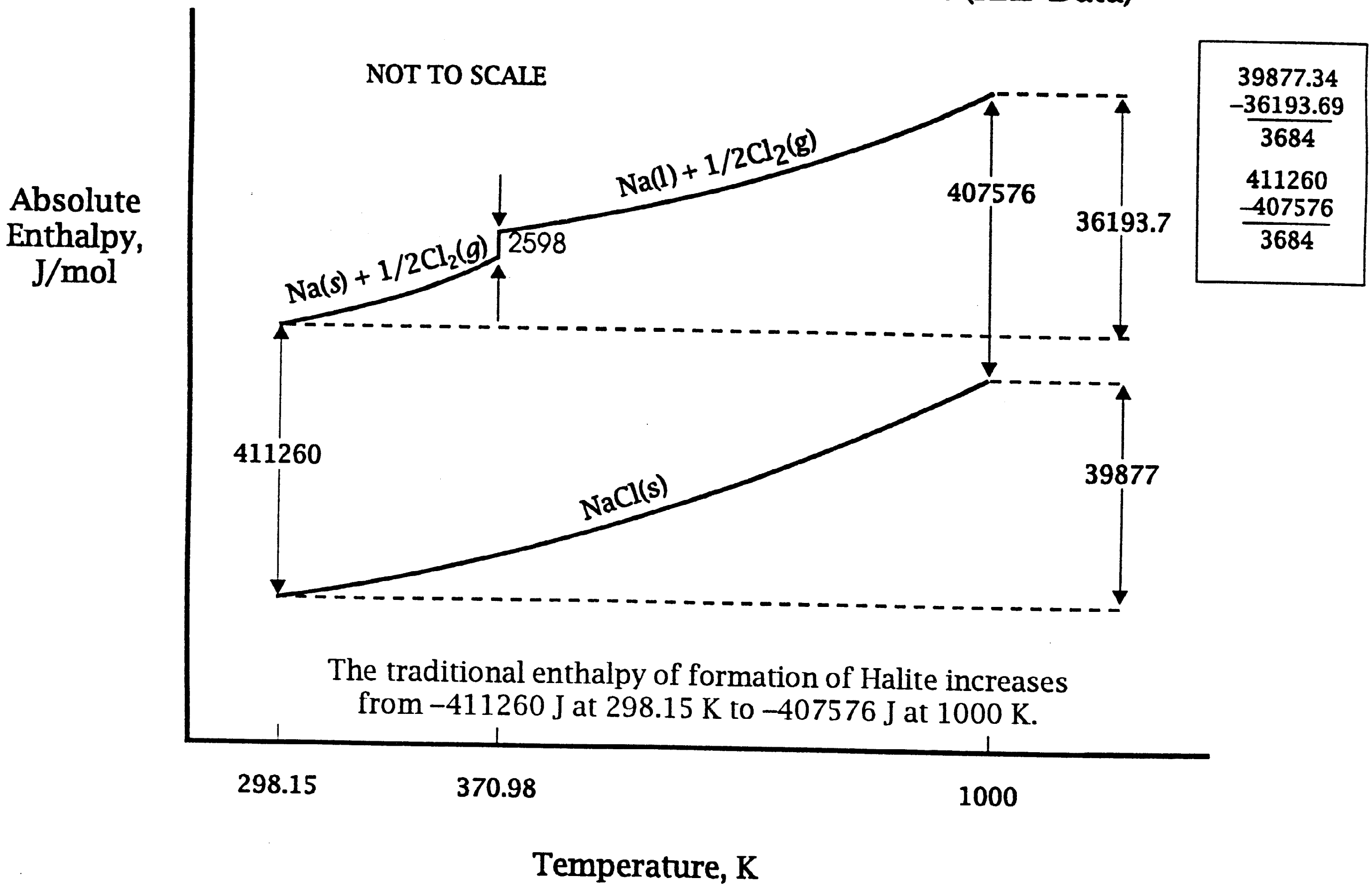
$$\begin{aligned} \Delta V^\circ &= 3.844\,\text{cm}^3\,\text{mol}^{-1} \quad \text{for } \mathrm{Mg_2SnO_4} \\ &= 0.0921\,\text{cal/bar} \\ &= 3.73\,\text{cm}^3\,\text{mol}^{-1} \quad \text{for } \mathrm{Co_2SnO_4} \\ &= 0.0892\,\text{cal/bar} \end{aligned}$$

$$
\begin{aligned}
\Delta G^\circ &= \Delta H^\circ - T\Delta S^\circ \\
&= -P\Delta V^\circ \\
\Delta S^\circ &= (P\Delta V^\circ + \Delta H^\circ)/T \\
&= (26000 \times 0.0921 + 1128)/1273 \\
&= 2.77\,\mathrm{cal\,mol^{-1}\,K^{-1}} \quad \text{for } \mathrm{Mg_2SnO_4} \\
&= (12000 \times 0.0892 - 2317)/1273 \\
&= -0.98\,\mathrm{cal\,mol^{-1}\,K^{-1}} \quad \text{for } \mathrm{Co_2SnO_4}
\end{aligned}
$$

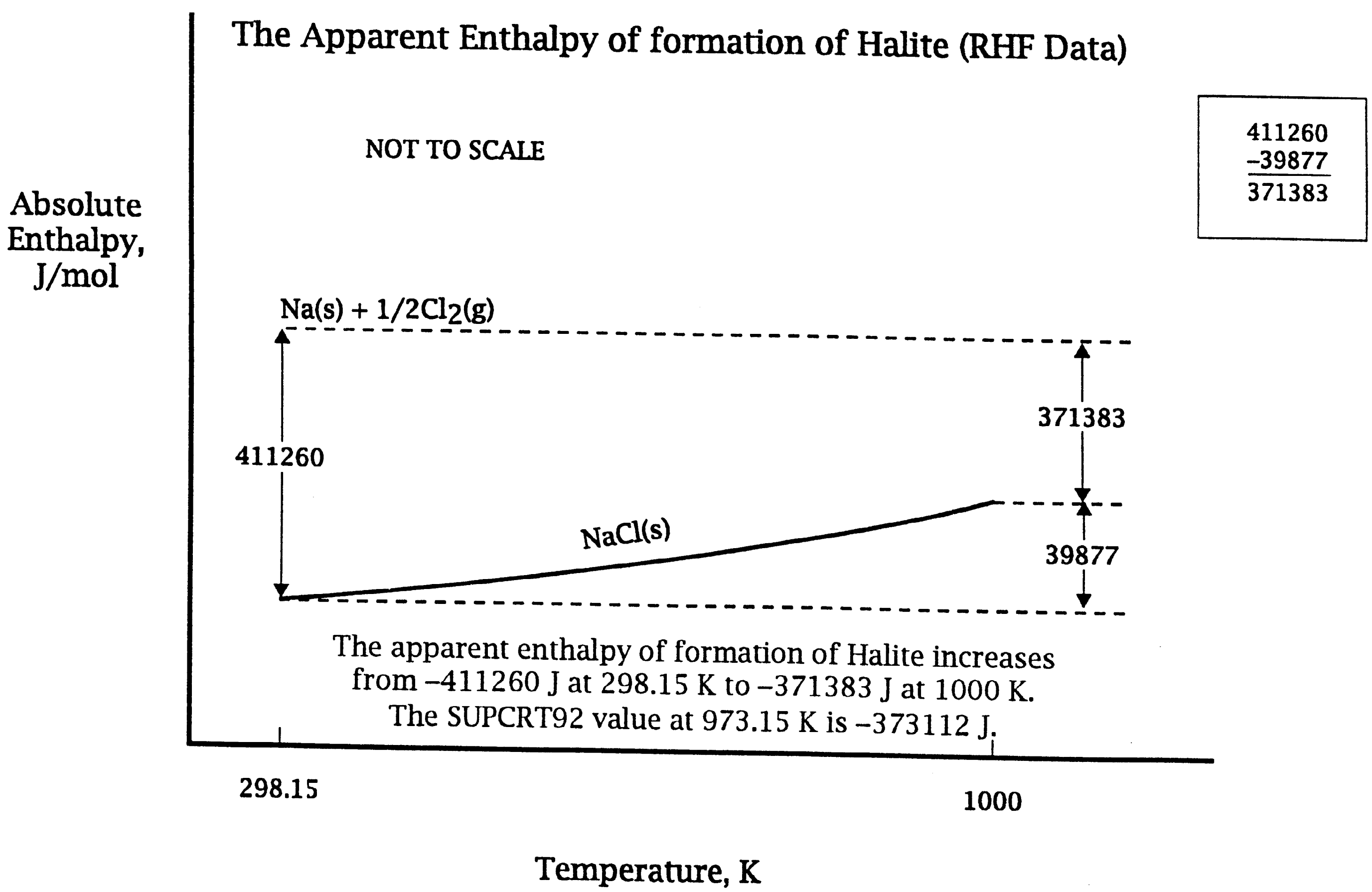
(d)

$$
\begin{aligned}
dP/dT &= \Delta S^\circ/\Delta V^\circ \\
&= 30.0\,\mathrm{bar/K} \quad \text{for } \mathrm{Mg_2SnO_4} \\
&= -11.0\,\mathrm{bar/K} \quad \text{for } \mathrm{Co_2SnO_4}
\end{aligned}
$$

The Traditional Enthalpy of formation of Halite (RHF Data)



The Apparent Enthalpy of formation of Halite (RHF Data)



The Traditional Enthalpy of Formation of Halite (NaCl) at 1000 K