



Compound	$\Delta H^\circ_f$ (kilocalories/ mole)	$S^\circ$ (calories/mole K)
H <sub>2</sub> O (l)	-68.3	16.7
CO <sub>2</sub> (g)	-94.1	51.1
O <sub>2</sub> (g)	0.0	49.0
C <sub>3</sub> H <sub>8</sub> (g)	?	64.5

When 1.000 gram of propane gas, C<sub>3</sub>H<sub>8</sub>, is burned at 25°C and 1.00 atmosphere, H<sub>2</sub>O(l) and CO<sub>2</sub>(g) are formed with the evolution of 50.33 kilojoules.

- (a) Write a balanced equation for the combustion reaction.
- (b) Calculate the molar enthalpy of combustion,  $\Delta H^\circ_{\text{comb}}$ , of propane.
- (c) Calculate the standard molar enthalpy of formation,  $\Delta H^\circ_f$ , of propane gas.
- (d) Calculate the entropy change,  $\Delta S^\circ_{\text{comb}}$ , for the combustion reaction and account of the sign of  $\Delta S^\circ_{\text{comb}}$ .

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