

## 11.2: Enthalpy as a function of Temperature

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The fact that  $C_P$  goes to zero asymptotically as the temperature goes to zero has no practical ramifications for the measurement or use of enthalpy. We can only measure changes in energy and enthalpy; no particular state of any system is a uniquely useful reference state for the enthalpy function. Experimental convenience is the only consideration that makes one reference state a better choice than another. In [Chapter 8](#), we define standard enthalpies of formation for elements and compounds. For this purpose, we choose to define the standard enthalpy of formation of each element to be zero at every temperature. For standard enthalpies of formation, the reference state is different at every temperature.

Compilations of thermodynamic data often choose 298.15 K and one bar as the zero of enthalpy for pure substances. (In citing data from such compilations, 298.15 K is frequently abbreviated to “298 K.”) Because it is near the ambient temperature of most laboratories, much thermochemical data has been collected at or near this temperature. Choosing a reference temperature near ambient laboratory temperatures helps minimize the errors introduced when we extrapolate experimental thermodynamic data to the reference temperature. Expressed relative to a reference temperature, the substance’s enthalpy at any other temperature is the change in enthalpy that occurs when the substance is taken from the reference temperature to that temperature. Such enthalpy changes are often called **absolute enthalpies**. Enthalpy-data tables frequently include values for “ $H_T^\circ - H_{298\text{K}}^\circ$ ” at a series of temperatures. These data should not be confused with enthalpies of formation.

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