

## 16.7: Standard Molar Entropies

Because the entropy of a substance depends on the amount of substance, the pressure, and the temperature, it is convenient to describe the entropy of a substance in terms of  $S_m^\circ$ , its **standard molar entropy**, i.e., as the entropy of 1 mol of substance at the standard pressure of 1 atm (101.3 kPa) and given temperature. Values of the standard molar entropies of various substances at 298 K (25°C) are given in the table. A table like this can be used in much the same way as a table of standard enthalpies of formation in order to find the entropy change  $\Delta S_m^\circ$  for a reaction occurring at standard pressure and at 298 K.

**Table 16.7.1** The Standard Molar Entropies of Selected Substances at 298.15 K (25°C)

Compound	$S_m^\circ / \text{J K}^{-1}\text{mol}^{-1}$	Compound	$S_m^\circ / \text{J K}^{-1}\text{mol}^{-1}$
<b>Solids</b>		<b>Diatomic Gases</b>	
C (diamond)	2.377		
C (graphite)	5.74	H <sub>2</sub>	130.7
Si	18.8	D <sub>2</sub>	145.0
Ge	31.1	HCl	186.9
Sn (gray)	44.1	HBr	198.7
Pb	64.8	HI	206.6
Li	29.1	N <sub>2</sub>	191.6
Na	51.2	O <sub>2</sub>	205.1
K	64.2	F <sub>2</sub>	202.8
Rb	69.5	Cl <sub>2</sub>	223.1
Cs	85.2	Br <sub>2</sub>	245.5
NaF	51.5	I <sub>2</sub>	260.7
MgO	26.9	CO	197.7
AlN	20.2	<b>Triatomic Gases</b>	
NaCl	72.1	H <sub>2</sub> O	188.8
KCl	82.6	NO <sub>2</sub>	240.1
Mg	32.7	H <sub>2</sub> S	205.8
Ag	42.6	CO <sub>2</sub>	213.7
I <sub>2</sub>	116.1	SO <sub>2</sub>	248.2
MgH <sub>2</sub>	31.1	N <sub>2</sub> O	219.9
AgN <sub>3</sub>	99.2	O <sub>3</sub>	238.9
<b>Liquids</b>		<b>Polyatomic Gases( &gt; 3)</b>	
Hg	76.0	CH <sub>4</sub>	186.3
Br <sub>2</sub>	152.2	C <sub>2</sub> H <sub>6</sub>	229.6
H <sub>2</sub> O	69.9	C <sub>3</sub> H <sub>8</sub>	269.9
H <sub>2</sub> O <sub>2</sub>	109.6	C <sub>4</sub> H <sub>10</sub>	310.2
CH <sub>3</sub> OH	126.8	C <sub>5</sub> H <sub>12</sub>	348.9
C <sub>2</sub> H <sub>5</sub> OH	160.7	C <sub>2</sub> H <sub>4</sub>	219.6
C <sub>6</sub> H <sub>6</sub>	172.8	N <sub>2</sub> O <sub>4</sub>	304.3
BCl <sub>3</sub>	206.3	B <sub>2</sub> H <sub>6</sub>	232.0

<b>Monatomic Gases</b>		BF <sub>3</sub>	254.0
He	126.0	NH <sub>3</sub>	192.5
Ne	146.2		
Ar	154.8		
Kr	164.0		
Xe	169.6		

This page titled [16.7: Standard Molar Entropies](#) is shared under a [CC BY-NC-SA 4.0](#) license and was authored, remixed, and/or curated by [Ed Vitz](#), [John W. Moore](#), [Justin Shorb](#), [Xavier Prat-Resina](#), [Tim Wendorff](#), & [Adam Hahn](#).