APPENDIX 4

Ionization Energies of Selected Metals

These ionization energies are in units of $MJ \cdot mol^{-1}$, and they have been summarized from G. Aylward and T. Findlay, *SI Chemical Data,* 3d ed. (New York: Wiley, 1994). Only selected ionization energies for outer (valence) electrons are listed.

The 1st ionization energy represents the energy required for the process:

$$M(g) \rightarrow M^{+}(g) + e^{-}$$

while that of the 2nd ionization process represents that for:

$$M^{+}(g) \rightarrow M^{2+}(g) + e^{-}$$

and successive ionization energies are defined similarly as one-electron processes.

	Ionization energy				
Element	**1st**	**2nd**	**3rd**	**4th**	**5th**
Lithium	0.526				
Beryllium	0.906	1.763			
Sodium	0.502				
Magnesium	0.744	1.457			
Aluminum	0.584	1.823	2.751		
Potassium	0.425				
Calcium	0.596	1.152			
Scandium	0.637	1.241	2.395		
Titanium	0.664	1.316	2.659	4.181	
Vanadium	0.656	1.420	2.834	4.513	6.300
Chromium	0.659	1.598	2.993		
Manganese	0.724	1.515	3.255		

	Ionization energy				
Element	**1st**	**2nd**	**3rd**	**4th**	**5th**
Iron	0.766	1.567	2.964		
Cobalt	0.765	1.652	3.238		
Nickel	0.743	1.759			
Copper	0.752	1.964			
Zinc	0.913	1.740			
Lead	0.722	1.457			