TABLE 1.1
The Chemical Symbols for the Elements
The names and symbols of the more frequently encountered elements are shown in color.

Ac	actinium	Gd	gadolinium	Po	polonium
Ag	silver*	Ge	germanium	Pr	praseodymium
Al	aluminum	H	hydrogen	Pt	platinum
Am	americium	He	helium	Pu	plutonium
Ar	argon	Hf	hafnium	Ra	radium
As	arsenic	Hg	mercury*	Rb	rubidium
At	astatine	Ho	holmium	Re	rhenium
Au	gold*	Hs	hassium	Rf	rutherfordium
B	boron	I	iodine	Rg	roentgenium
Ba	barium	In	indium	Rh	rhodium
Be	beryllium	Ir	iridium	Rn	radon
Bh	bohrium	K	potassium*	Ru	ruthenium
Bi	bismuth	Kr	krypton	S	sulfur
Bk	berkelium	La	lanthanum	Sb	antimony*
Br	bromine	Li	lithium	Sc	scandium
C	carbon	Lr	lawrencium	Se	selenium
Ca	calcium	Lu	lutetium	Sg	seaborgium
Cd	cadmium	Md	mendelevium	Si	silicon
Ce	cerium	Mg	magnesium	Sm	samarium
Cf	californium	Mn	manganese	Sn	tin*
Cl	chlorine	Mo	molybdenum	Sr	strontium
Cm	curium	Mt	meitnerium	Ta	tantalum
Co	cobalt	N	nitrogen	Tb	terbium
Cr	chromium	Na	sodium*	Tc	technetium
Cs	cesium	Nb	niobium	Te	tellurium
Cu	copper*	Nd	neodymium	Th	thorium
Db	dubnium	Ne	neon	Ti	titanium
Ds	darmstadtium	Ni	nickel	Tl	thallium
Dy	dysprosium	No	nobelium	Tm	thulium
Er	erbium	Np	neptunium	U	uranium
Es	einsteinium	O	oxygen	V	vanadium
Eu	europium	Os	osmium	W	tungsten*
F	fluorine	P	phosphorus	Xe	xenon
Fe	iron*	Pa	protactinium	Y	yttrium
Fm	fermium	Pb	lead*	Yb	ytterbium
Fr	francium	Pd	palladium	Zn	zinc
Ga	gallium	Pm	promethium	Zr	zirconium

Only 111 elements are listed in this table. The remaining six elements, discovered (synthesized) between 1996 and 2006, are yet to be named.
* These elements have symbols that were derived from non-English names.

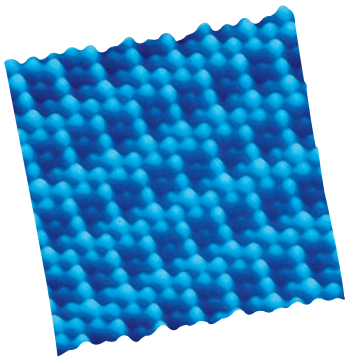

Figure 1.11 A computer reconstruction of the surface of a crystal as observed with a scanning tunneling microscope. The image reveals a regular pattern of individual atoms. The color was added to the image by the computer and is used to show that two different kinds of atoms are present.

1.9 ATOMS AND MOLECULES

Consider the process of subdividing a sample of the element gold (or any other element) into smaller and smaller pieces. It seems reasonable that eventually a "smallest possible piece" of gold would be reached that could not be divided further and still be the element gold. This smallest possible unit of gold is called a gold atom. An **atom** *is the smallest particle of an element that can exist and still have the properties of the element.*

A sample of any element is composed of atoms of a single type, those of that element. In contrast, a compound must have two or more types of atoms present, because by definition at least two elements must be present (Section 1.6).

No one ever has seen or ever will see an atom with the naked eye; they are simply too small for such observation. However, sophisticated electron microscopes, with magnification factors in the millions, have made it possible to photograph "images" of individual atoms (Figure 1.11).