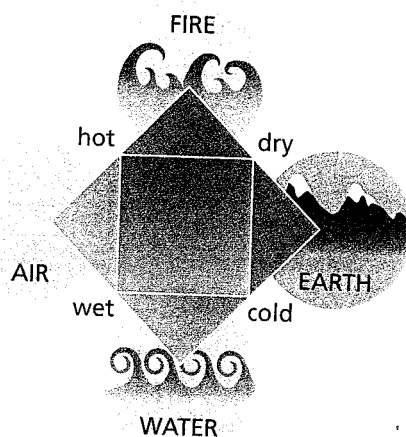


The Elements

Key Ideas

Ancient chemistry provided practical information, but not a good understanding of matter.

- Ancient chemistry was about either the practical use of materials or their connection with the spiritual world.
- Thinking of matter as combinations of only four elements limited new learning about chemistry for many centuries.
- A new era of chemistry began when scientists started to observe and experiment.



Vocabulary

metals, p. 190

non-metals, p. 191

metalloids, p. 191

Modern chemists began to find and name new elements and compounds, and developed a universal system for naming elements and compounds.

- The modern chemists started to do experiments and hastened the discovery of elements and compounds.
- Observation and experimentation were used to see if substances could be broken down. New elements were identified when substances could not be broken down further.
- The system Berzelius developed gave all elements and compounds a unique symbol.
- The new language of elements and compounds enabled chemists to discuss and share what they learned more easily.

Name	Symbol	Name	Symbol	Name	Symbol	Name	Symbol
aluminum	Al	chromium	Cr	indium	In	oxygen	O
antimony	Sb	cobalt	Co	iodine	I	palladium	Pd
arsenic	As	copper	Cu	iron	Fe	phosphorus	P

Elements can be classified into three categories: metals, non-metals, and metalloids.

- Although each element is unique, all the elements can be classified into three main groups that share some of the same properties.
- The majority of all elements are metals, sharing the properties of lustre, electrical and heat conductivity, malleability, and ductility.
- Elements in the smaller, but equally important, group of non-metals mainly share the characteristic that they lack the properties of metals.
- Metalloids are between the metals and the non-metals. They share some of the properties of both groups.



The Periodic Table orders the elements into groups with the same properties.

- Dmitri Mendeleev developed a table based on the increasing mass of the elements and on the repeating properties of groups of elements.
- The Periodic Table was able to predict new elements that had not yet been discovered.

Groups	I	II	III	IV	V	VI	VII	VIII
Formulas of Compound	R_2O	RO	R_2O_3	RO_2 H_4R	R_2O_5 H_3R	RO_3 H_2R	R_2O_7 HR	RO_4
1	H(1)							
2	Li(7)	Be(9.4)	B(11)	C(12)	N(14)	O(16)	F(19)	
3	Na(23)	Mg(24)	Al(27.3)	Si(28)	P(31)	S(32)	Cl(35.5)	
4	K(39)	Ca(40)	—(44)	Ti(48)	V(51)	Cr(52)	Mn(55)	Fe(56) Co(59) Ni(59) Cu(63)
5	[Cu(63)]	Zn(65)	—(68)	—(72)	As(75)	Se(78)	Br(80)	
6	Rb(85)	Sr(87)	?Yt(88)	Zr(90)	Nb(94)	Mo(96)	—(100)	Ru(104) Rh(104) Pd(105) Ag(108)
7	[Ag(108)]	Cd(112)	In(113)	Sn(118)	Sb(122)	Te(125)	I(127)	