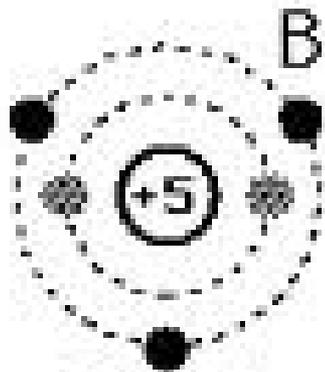
The background of the slide is a light greenish-yellow color. On the left side, there is a faint image of a person's hands pouring liquid from a glass flask into a beaker. On the right side, there is a faint image of a ball-and-stick molecular model. The main title is centered in the upper half of the slide.

# Exploring the Periodic Table

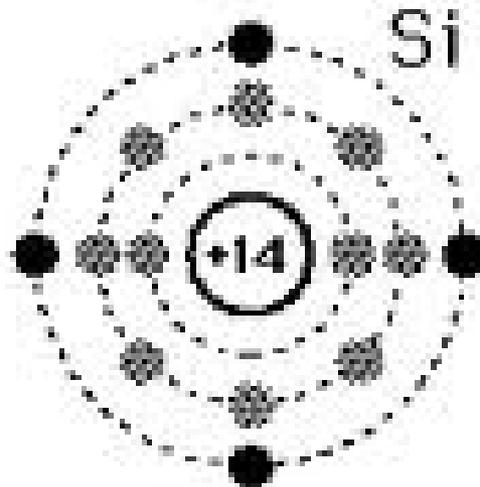
Chapter 5.2

# The Role of Electrons

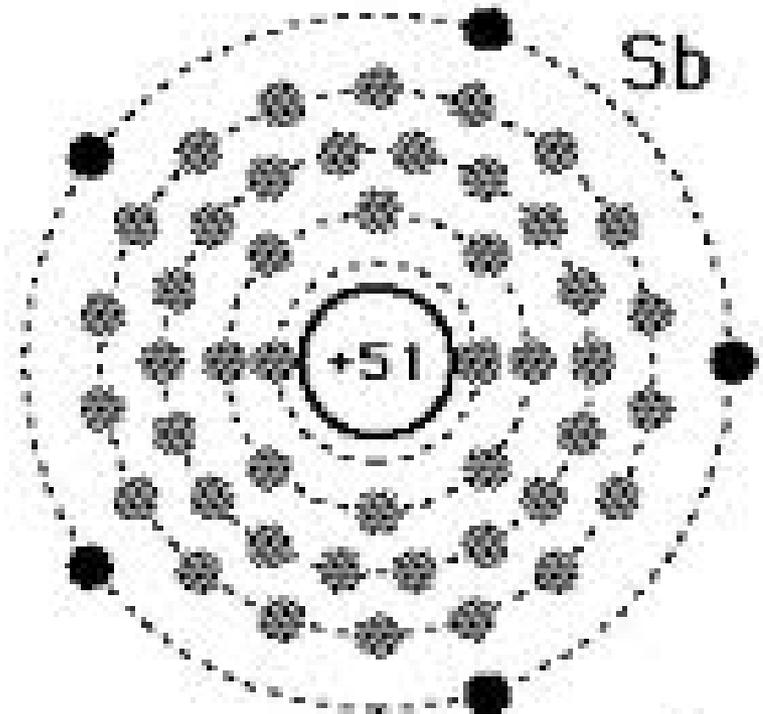
- For a **neutral** atom, *the number of protons equals the number of electrons.*
- The periodic trends in the periodic table are the result of **electron arrangement.**



**Boron**  
3 Valence  
Electrons



**Silicon**  
4 Valence  
Electrons

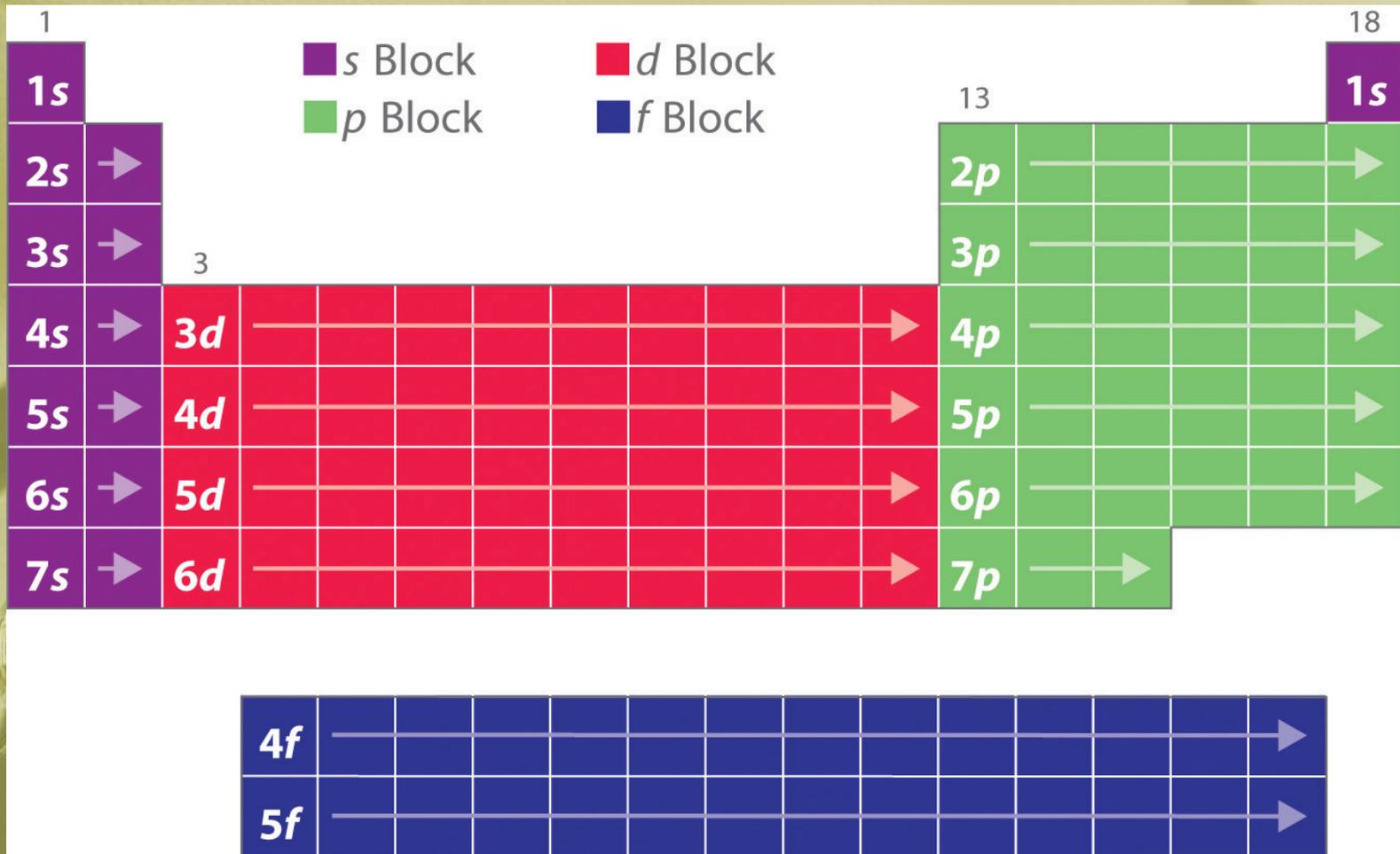


**Antimony (5 Valence)**



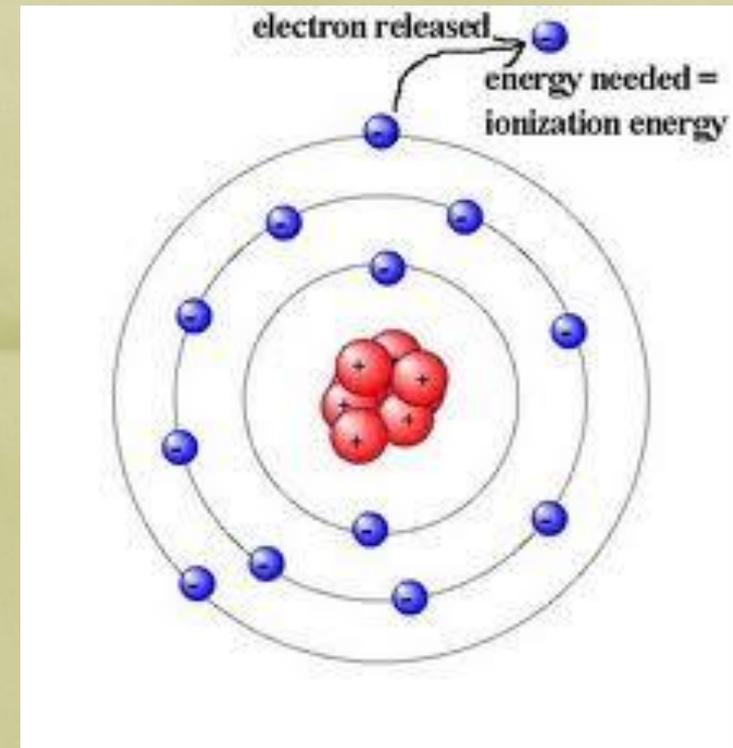
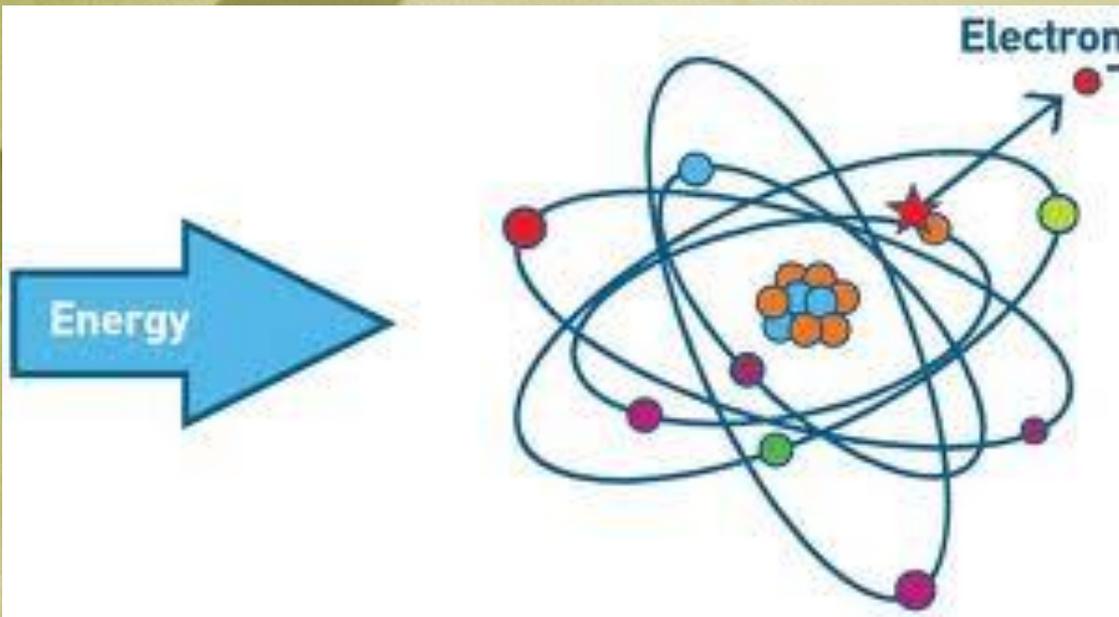
# The Role of Electrons

- An **element's location** in the periodic table is related to **electron arrangement**.



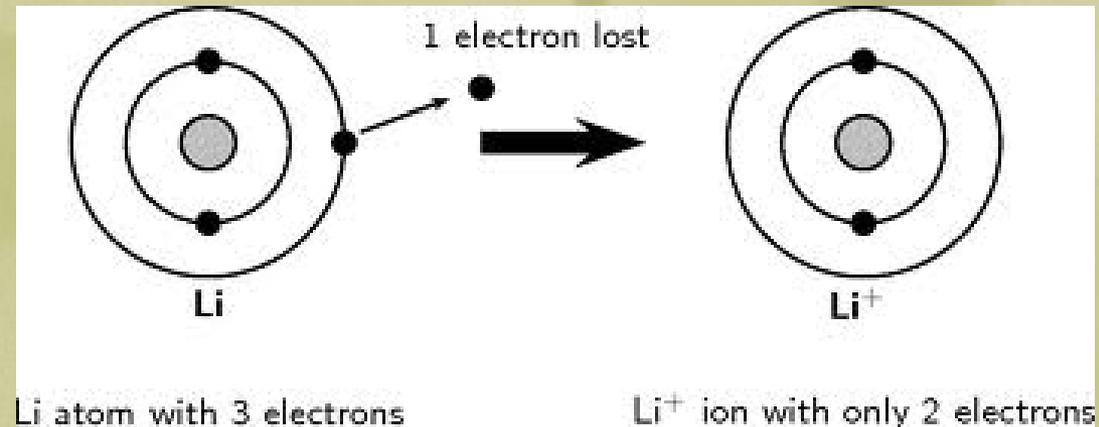
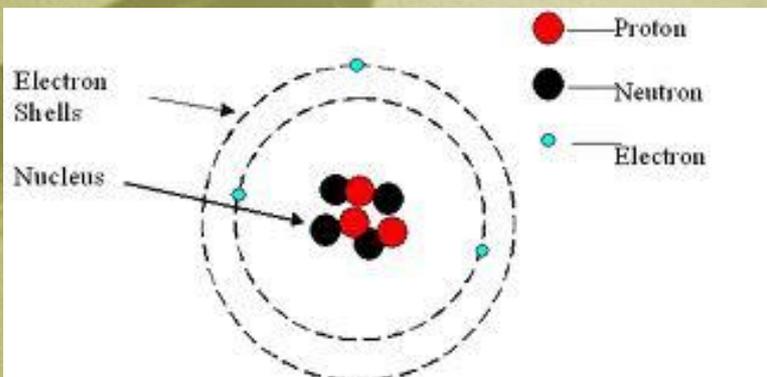
# Ion Formation

- Atoms whose outermost orbitals are not filled may undergo a process called **ionization**.
- If an atom gains or loses electrons, it no longer has an equal number of electrons and protons.
- Because the charges do not cancel completely, the atom has a **net electric charge**.
- A charged atom is called an **ion**.



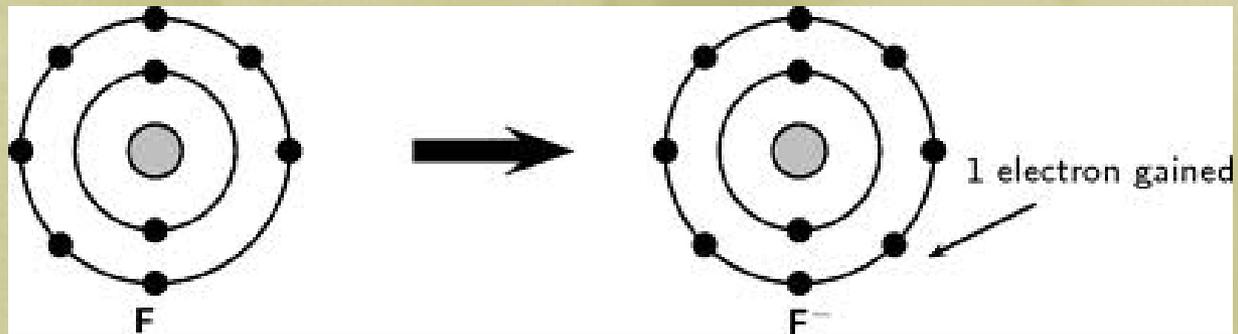
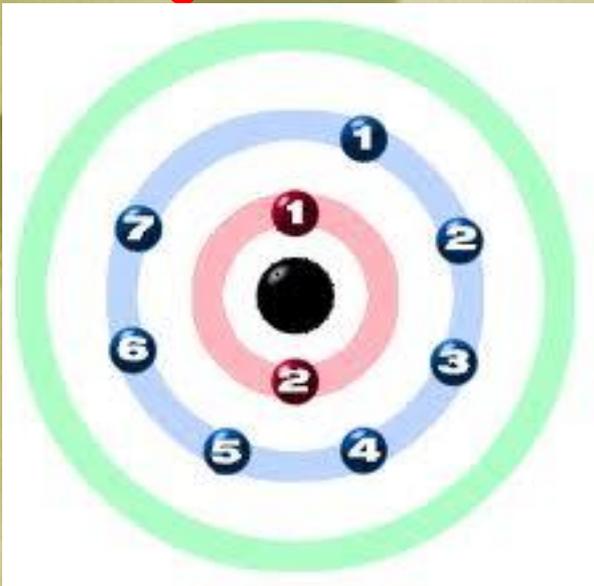
# Ion Formation

- **Group 1 elements form positive ions.**
- A lithium atom has 2 electrons in the first level, but only 1 in the second level. (3 total electrons)
- This single valence electron is easily removed, which makes lithium very reactive.
- Removing this electron forms a **positive ion**, or **cation**.



# Ion Formation

- **Group 17 elements form negative ions.**
- The fluorine atom has 2 electrons in the first level and 7 electrons in the second level. (9 electrons total)
- A fluorine atom needs only one electron to have a filled outermost energy level.
- An atom of fluorine easily gains an electron to form a **negative ion**, or **anion**.



# How are Elements Classified?

- All elements are either **metals**, **nonmetals**, or **semiconductors**.

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### Periodic Table of the Elements

**Classification Legend:**

- Metals (Blue)
- Semiconductors (Green)
- Nonmetals (Orange)

**Key:**

- element name: **Hydrogen**
- symbol of element: **H**
- atomic number: **1**
- atomic weight: **1.008**

**Values in parentheses are the mass numbers of the most stable or best-known isotopes.**

**Names and symbols for elements 113-114 are under review.**

Period	IA (1)	IIA (2)	Transition Elements										IIIA (13)	IIIA (14)	VA (15)	VIA (16)	VIA (17)	VIA (18)
1	H (1)												B (5)	C (6)	N (7)	O (8)	F (9)	Ne (10)
2	Li (3)	Be (4)											B (5)	C (6)	N (7)	O (8)	F (9)	Ne (10)
3	Na (11)	Mg (12)											Al (13)	Si (14)	P (15)	S (16)	Cl (17)	Ar (18)
4	K (19)	Ca (20)	Sc (21)	Ti (22)	V (23)	Cr (24)	Mn (25)	Fe (26)	Co (27)	Ni (28)	Cu (29)	Zn (30)	Ga (31)	Ge (32)	As (33)	Se (34)	Br (35)	Kr (36)
5	Rb (37)	Sr (38)	Y (39)	Zr (40)	Nb (41)	Mo (42)	Tc (43)	Ru (44)	Rh (45)	Pd (46)	Ag (47)	Cd (48)	In (49)	Sn (50)	Sb (51)	Te (52)	I (53)	Xe (54)
6	Cs (55)	Ba (56)	La (57)	Hf (58)	Ta (59)	W (60)	Re (61)	Os (62)	Ir (63)	Pt (64)	Au (65)	Hg (66)	Tl (67)	Pb (68)	Bi (69)	Po (70)	At (71)	Rn (72)
7	Fr (77)	Ra (78)	Ac (79)	Rf (80)	Sg (81)	Bh (82)	Hs (83)	Mt (84)	Uun (85)	Uuu (86)	Uub (87)	Uuq (88)						

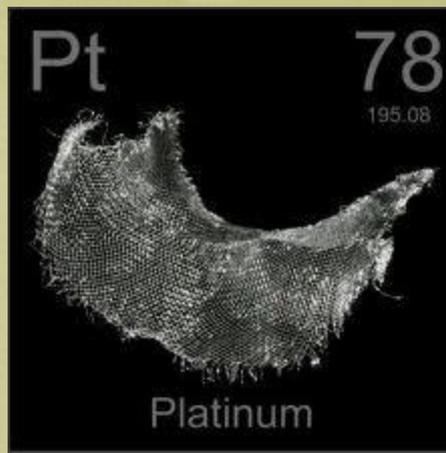
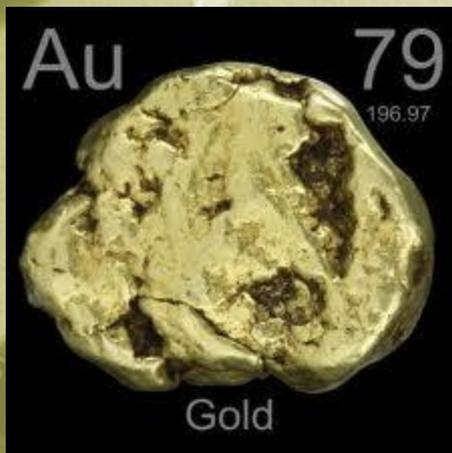
Lanthanides	Ce (58)	Pr (59)	Nd (60)	Pm (61)	Sm (62)	Eu (63)	Gd (64)	Tb (65)	Dy (66)	Ho (67)	Er (68)	Tm (69)	Yb (70)	Lu (71)
	140.1	140.9	145.2	(145)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	174.9

Actinides	Th (88)	Pa (89)	U (92)	Np (93)	Pu (94)	Am (95)	Cm (96)	Bk (97)	Cf (98)	Es (99)	Fm (100)	Md (101)	No (102)	Lr (103)
	232.0	231.0	238.0	(237)	(244)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(260)	(260)

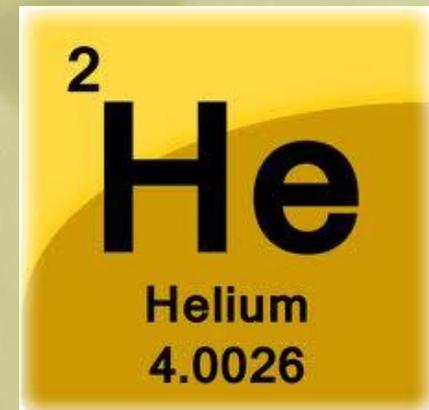
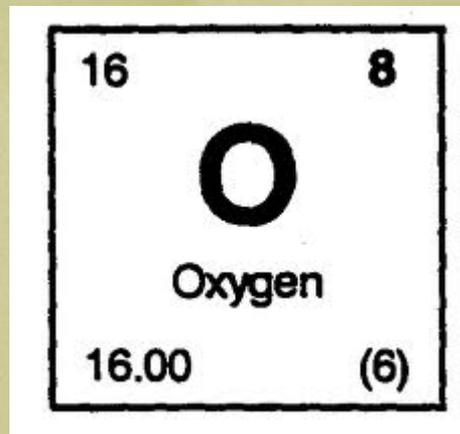
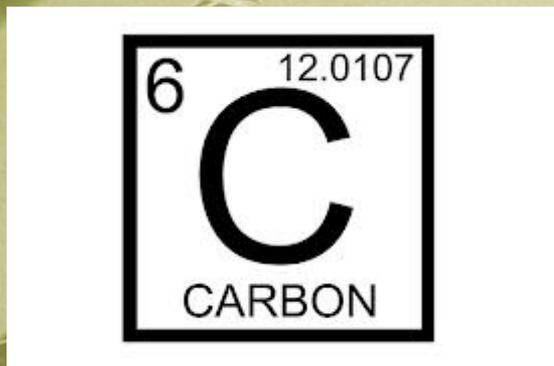
# How are Elements Classified?

- Most elements are **metals**, which are elements that are shiny and conduct heat and electricity well.
- Some examples are gold, platinum, and copper.



# How are Elements Classified?

- Some elements are **nonmetals**, which are elements that conduct heat and electricity poorly.
- Some examples include carbon, oxygen, and helium.



# How are Elements Classified?

- Some elements can conduct electricity under certain conditions.
- These are known as **semiconductors**, which is an element that conducts electricity better than an insulator but not as well as a conductor.
- Sometimes called **metalloids**.

Legend																	
Yellow	Nonmetals																
Green	Semimetals																
Purple	Metals																
H	He																
Li	Be	B	C	N	O	F	Ne										
Na	Mg	Al	Si	P	S	Cl	Ar										
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sb	Te	I	Xe	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr	

