

ATOMS AND MATERIAL PROPERTIES

Lesson 1
EET 150



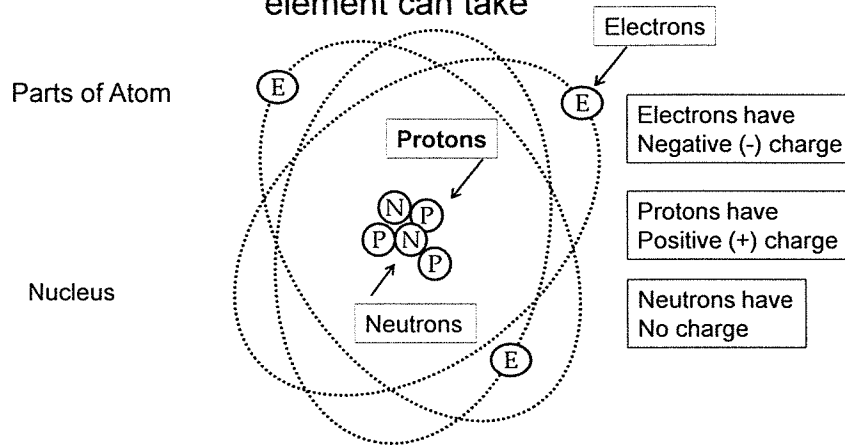
Atoms and Matter Learning Objectives

- ▣ In this lesson you will:
- ▣ examine the parts of an atom.
- ▣ study electric charges.
- ▣ see the structure of an atom.
- ▣ study electron flow and its causes.
- ▣ divide substances into groups of conductors, insulators and semiconductors.
- ▣ see different ways to represent electron flow in electric circuits.



MATTER AND ATOMS

Atoms are the smallest unit of matter an element can take



Atomic Charges

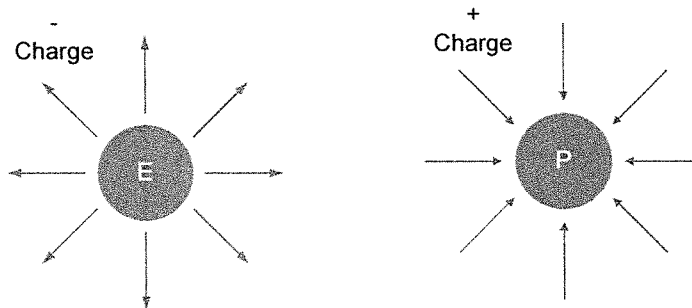
Atoms with excess electrons have negative charge

Atoms with excess proton (less electrons) have positive charge

Charged atoms called ions

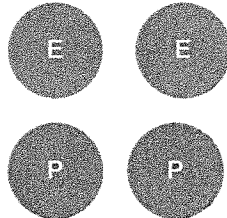
Law of Charges

Charged particles exert force on each other



Law of Charges

Likes repel



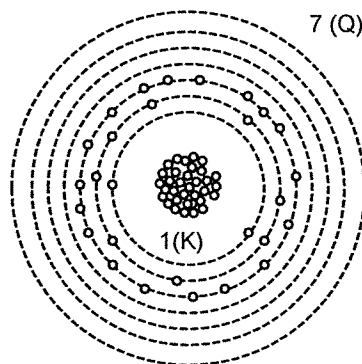
Opposites attract



Example: static electricity

Matter and Atoms

Electrons Located in Shells

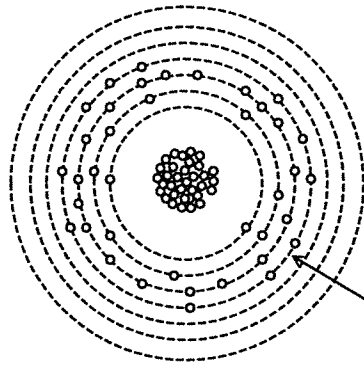


Shell Number (Letter) Max Electrons In Shell

1 (K)	2
2 (L)	8
3 (M)	18
4 (N)	32
5 (O)	50
6 (P)	72
7 (Q)	98

Electron Energy Determines Shell Level

Valence Shells



Not all atoms have 7 shells

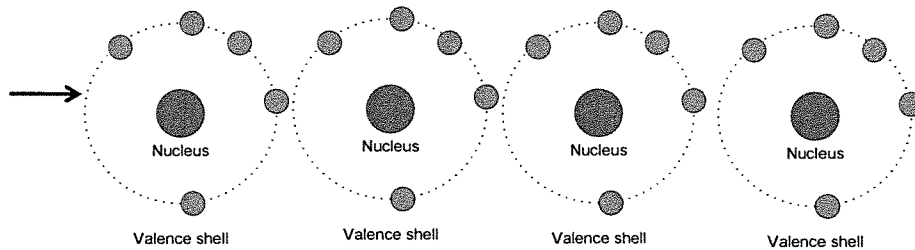
Last shell called valence shell

Most elements have incomplete Valence shells

Valence Shell

Electron Flow

Outside force makes electrons move



Electrical Insulators

Insulators have difficult movement of electrons in valence shell

Insulators have five or more electrons in valence shell

Examples

Glass
Rubber
Plastics
Paper



Combinations of elements
(Compounds)

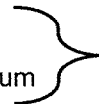
Semiconductors

Neither good insulators or good conductors

Can be made to amplify and switch electric currents

Examples

Silicon
Germanium



Materials used in electronic
devices (Chips)

Carbon

Electron Flow

Forces cause electron flow producing electric current

Example Forces	Practical Example
Chemical reaction	(batteries)
Pressure	(piezo crystals, microphones)
Light	(solar cells)
Friction	(static electricity)
Magnetism	(generators)

Electrical Conductors

Conductors have free movement of electrons in valence shell

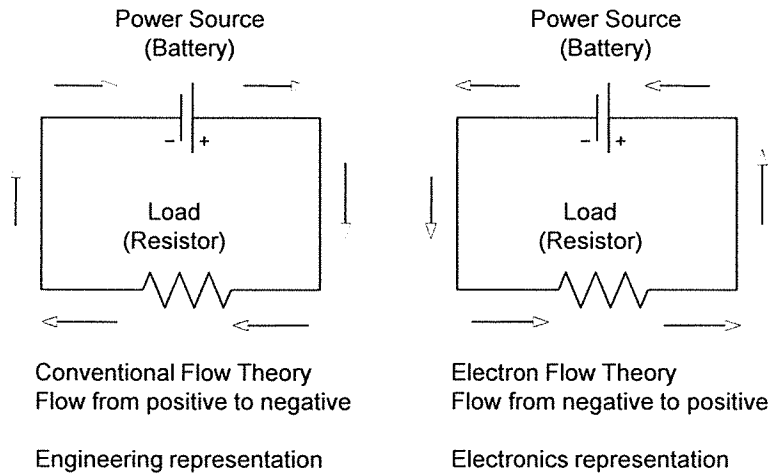
Good conductors have four or less electrons in valence shell

Examples

Copper
Gold
Silver
Aluminum
Iron

} All Metallic Elements

Electron Flow Representations



Atoms and Matter

End Lesson 1 EET 150

Coming Next: Basic Components
and Symbols

