

ATOMS AND MATERIAL PROPERTIES

Lesson 1
EET 150



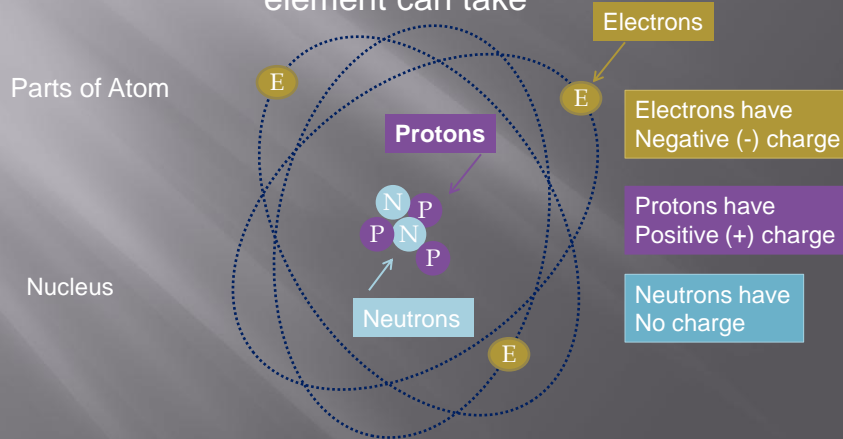
Atoms and Matter Learning Objectives

- ▣ **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

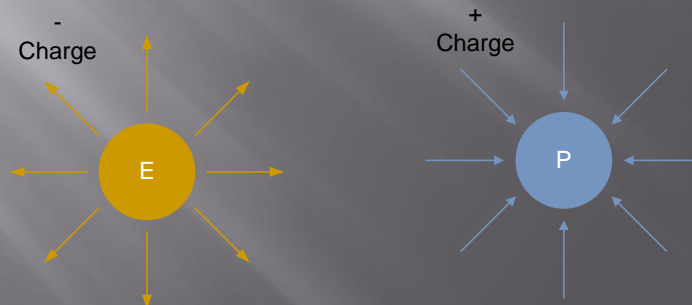
Atoms with excess electrons have negative charge

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

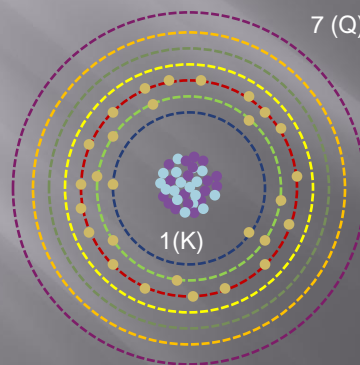


Example: static electricity



Matter and Atoms

Electrons Located in Shells



7 (Q) Shell Number
(Letter) Max. Electrons
In Shell

1 (K) 2

2 (L) 8

3 (M) 18

4 (N) 32

5 (O) 50

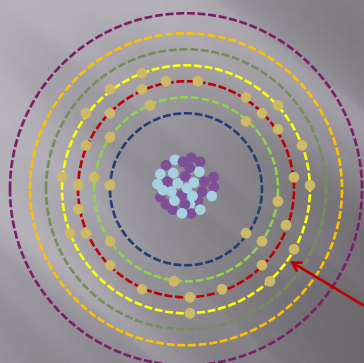
6 (P) 72

7 (Q) 98

Electron Energy Determines Shell Level



Valence Shells



Not all atoms have 7 shells

Last shell called valence shell

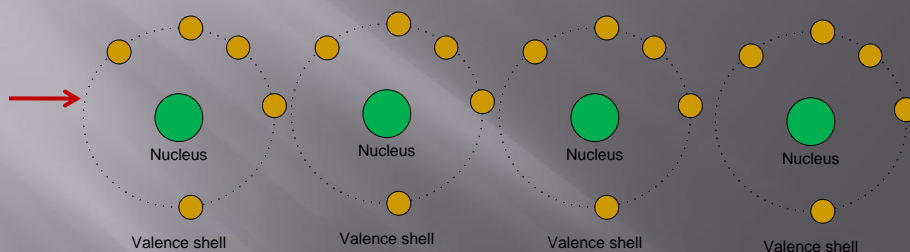
Most elements have incomplete Valence shells

Valence Shell



Electron Flow

Outside force makes electrons move



Electron Flow

Forces cause electron flow producing electric current

Example Forces

Chemical reaction

Pressure

Light

Friction

Magnetism

Practical Example

(batteries)

(piezo crystals, microphones)

(solar cells)

(static electricity)

(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



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

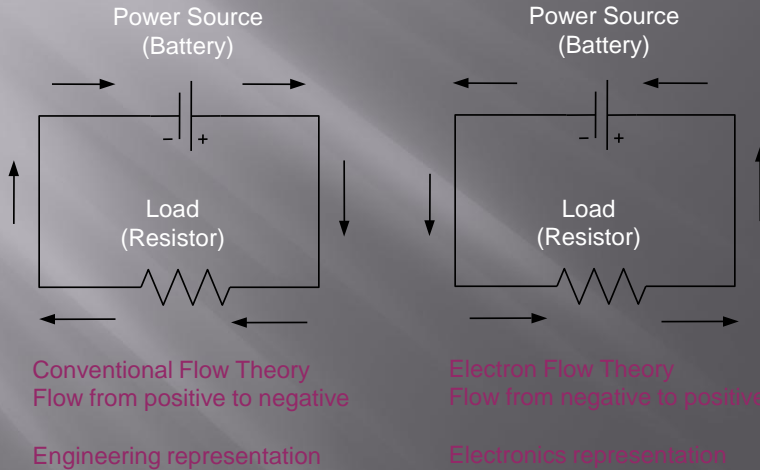
Silicon
Germanium

Carbon

Materials used in electronic
devices (Chips)



Electron Flow Representations



Atoms and Matter

End Lesson 1 EET 150

Coming Next: Basic Components
and Symbols

