Notes on atomic structure and conductivity

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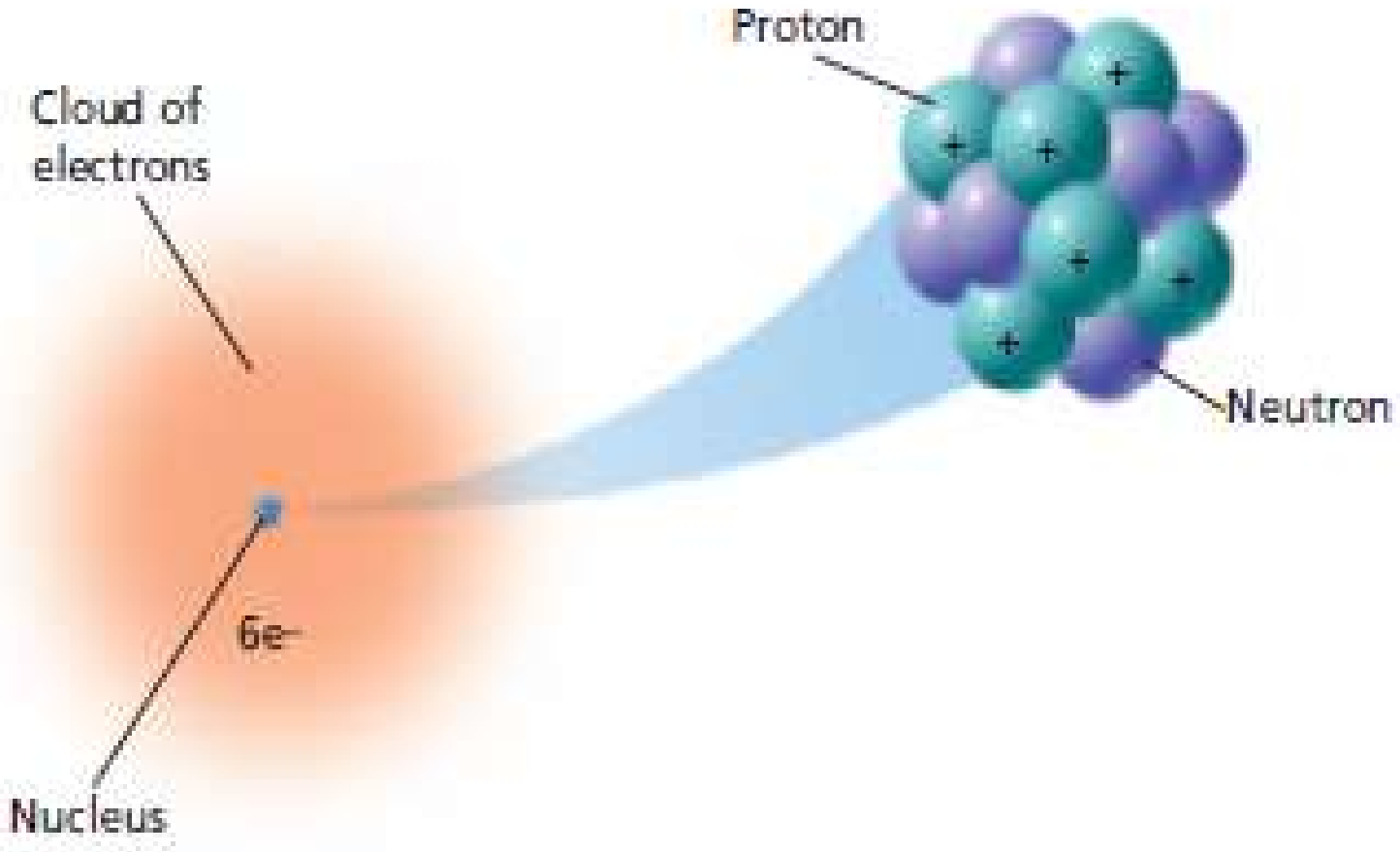
Modern model of an atom



Structure defined

- Nucleus – is the small, dense, positively charged center of the atom. It contains most of the atom's mass. It consists of neutrons & protons.
- Neutrons – are particles in the nucleus of an atom that have no charge but provide mass.
- Protons – are positively charged particles in the nucleus of an atom; number of protons "defines" the element.
- Electrons – negatively charged particles outside the nucleus; responsible for bonding, chemical properties and important in electric current transmission; can be loosely or tightly held

Electrons and conductivity

- **Conductors** are materials that permit electrons to flow freely from particle to particle.
- Objects made of a conducting material will allow charge to be transferred across the entire surface of the object.
- **insulators** are materials that impede the free flow of electrons from atom to atom and molecule to molecule.
- If charge is transferred to an insulator at a given location, the excess charge will remain at the initial location of charging.
- Since the particles of the insulator do not permit the free flow of electrons, charge is seldom distributed evenly across the surface of an insulator.

Electron flow (current) through a conductor

- As each electron moves through a conductor, it pushes on the one ahead of it
- All the electrons move together as a group.
- The starting and stopping of electron flow through the length of a conductive path is virtually instantaneous from one end of a conductor to the other
- The tube is full of marbles, just as a conductor is full of free electrons ready to be
- If a single marble is suddenly inserted into this full tube on the left-hand side, another marble will immediately try to exit the tube on the right.
- Even though each marble only traveled a short distance, the transfer of motion through the tube is virtually instantaneous from the left end to the right end, no matter how long the tube is.